

1508/961
K THE
F A R M E R ' s
COMPLEAT GUIDE,

THROUGH ALL THE
ARTICLES of his PROFESSION;

THE
LAYING OUT, PROPORTIONING,
and CROPPING his GROUND;

AND
The RULES for PURCHASING, MANAGING,
and PRESERVING his STOCK.

IN PARTICULAR,

- | | |
|---|---|
| The Choice and Culture of
Wheat, Barley and Oats,
from the Seed to the Barn. | The Raising of Hemp, Flax
and Hops; and an Ac-
count of the New Lucerne. |
| The most profitable Way of
raising Turneps, with a
Proposal for introducing
the <i>Northern</i> Turnep,
called the <i>Naper</i> , which
will live on Bogs. | The Raising of Hedge
Shrubs, Coppice Wood,
and Timber Trees. |
| The Management of Mea-
dow and Pasture Ground,
and raising of artificial
Grasses. | The whole Doctrine of
Soils and Manures, and
the Ways of suiting one
to the other in all In-
stances. |
| The Culture of Beans, Pease,
Tares, and Thatches. | And cheap and effectual Re-
medies for all the Diseases
of Cattle. |

L O N D O N :

Printed for G. KEARSLEY, at the Golden-Lion in Ludgate-
Street. M.DCC.LX.

THE
F. A. R. M. E. R.'S
COMPLETE GUIDE.

ARTICLES OF ASSOCIATION

LAYING OUT PROPORTIONING
AND CROPPING A GROUND

THE RUBBER TRADING COMPANY
INCORPORATED IN ST. LOUIS



Printed for C. K. & S. at the Golden-Lion in Ludgate.
LONDON.

CONTENTS.

Introduction.

Page 1.

CHAP. I.

*Of the proportioning the quantity of grass ground
and tillage.*

3

CHAP. II.

*Of the management of Wheat from the seed to the
harvest.*

14

CHAP. III.

Of Barley.

55

CHAP. IV.

Of Oats.

73

CHAP. V.

Of the culture of Rye.

81

CHAP. VI.

Of Turneps.

86

CHAP. VII.

Of the Northern Turneps.

97

A 2

CHAP.

C H A P. VIII.

A proposal for cultivating the Naper Turnep on boggs. 99

C H A P. IX.

Of the culture of Clover. 104

C H A P. X.

Of Saintfoin. 119

C H A P. XI.

Of Lucerne. 137

C H A P. XII.

Of Natural Grass. 150

C H A P. XIII.

Of the Pulse kinds. 179

C H A P. XIV.

The management of a crop of Beans. *ib.*

C H A P. XV.

Of Pease. 199

C H A P. XVI.

Of Tares. 213

C H A P. XVII.

Of Thetches. 217

C H A P.

<i>Of Lentills.</i>	C H A P. XVIII.	223
<i>Of Hops.</i>	C H A P. XXIX.	229
<i>Of Flax.</i>	C H A P. XX.	257
<i>Of Hemp.</i>	C H A P. XXI.	269
<i>Of the new Lucerne.</i>	C H A P. XXII.	289
<i>Of the Rape Plant.</i>	C H A P. XXIII.	296
<i>Of Woad.</i>	C H A P. XXIV.	299
<i>Of Coppice Plantations.</i>	C H A P. XXV.	304
<i>Of Hedge Shrubs.</i>	C H A P. XXVI.	310
<i>Of Timber Trees</i>	C H A P. XXVII.	316
<i>Of Soils and Manures.</i>	C H A P. XXVIII.	320
	C H A P.	

CHAP. XXIX.
Of Chalk. 349

CHAP. XXX.
Of Lime. 350

CHAP. XXXI.
Of the effects of Waters of different kinds. 356

CHAP. XXXII.
Of the different uses of hard and soft Waters. 367

CHAP. XXXIII.
Of the Farmer's stock. 371

CHAP. XXXIV.
Of the Horse. 372

CHAP. XXXV.
Of the diseases of Horses. 374

CHAP. XXXVI.
Of Oxen and Cows. 396

CHAP. XXXVII.
Of Sheep. 403

CHAP. XXXVIII.
Of Hogs. 414

(s)
(i)
If I am not much mistaken, a great many have undertaken to write upon this subject, who have not been qualified: nay, though it



to express it. The proper person is a gentle-
man who has a large estate in his own hands:
and to say I may be bold to tell the result of
this, I am not; I have not wanted
a school education, I keep a good deal of
ground under my own care, and I have had
some experience. If my title be not to him as
it ought, I beg the reader will attribute it to a
young husbandman, and I would not
him, he will find in the matter nothing but

**THE
PRACTICE
OF
HUSBANDRY.**

INTRODUCTION.

MANY books have been written on farming, and I hope they have done good: but there is yet room for more advice to the practical husbandman. Every year brings new experience; and those who have tried the proposed methods, will do good service by telling the result of them. The field is so large that there yet want hands.

B

If

If I am not much mistaken, a great many have undertaken to write upon this subject, who have not been qualified: nay, though it seems the plainest of all matters, perhaps there are really but few who can be expected to write on it to any good purpose. Scholars are too refined in their speculations; and farmers are ignorant of the manner of instructing: the first of these want knowledge; and the latter, tho' they have a great deal, do not know how to express it. The proper person is a gentleman who has a large farm in his own hands: and so far I may be bold to tell the reader of this treatise I am qualified; I have not wanted a school education, I keep a good deal of ground under my own care, and I have had some experience. If my stile be not so fine as it ought, I beg the reader will attribute it to a long residence in the country; and I promise him he will find in the matter nothing but truth.

Farming may be divided into two kinds, pasture and tillage: the first is the easiest, but the other is by far the most profitable; not but a great deal more may be made of grass land than commonly is. I shall not, therefore, neglect this last in the end; but shall set out with the other in consideration of its greater importance: and as the purpose of this work is real information, I shall give no place in it to idle theory or vain conjecture; but relate what has been proved by experience only.

C H A P. I.

*Of the proportioning the quantity of grass ground
and tillage.*

A Necessary consideration to all who are to begin farming, or who are desirous of making more advantage of what they have, is the choice and quantity of ground for each kind of husbandry. Cattle must be fed; for the business can't be carried on without them; and there are some lands too wet for corn, which yet will produce grass to advantage. These are the two objects the farmer is to have in his eye: his reason must guide him in this article; and he is to pay very little regard to what has been hitherto written about it. Those who wrote of farming in the last century made excellent computations of the proportion to be observed between the stock and the crop; and all who have written since, at least a very few excepted, have copied or retailed in other words those old directions. They were good at that time, but they are not now; for those authors wrote before the general use of the artificial grasses. There was in their time little beside pasture grass for the food of all sorts of cattle; but we have now found the way to raise better meat for them by tillage; and consequently less natural grass is needed. I, therefore, set out in this principle, that in

the same farm, twice the quantity of ground may be now converted into tillage, which could be some years ago: and that the profit will be more than double from the change. To say exactly how many acres in any farm should be for one use, and how many for another is impossible, for this must depend upon many particular circumstances: but every one will judge easily for himself, on considering the following particulars.

If a man has his choice of ground; that is, if he has not yet begun farming, but is to rent or to purchase the spot whereon he is to exercise his industry, we shall, when he has seen the reasons and the advantages of particular situations, direct his choice. He will better receive those directions then, because he will understand the causes why they are given; but as few persons are in this state of choice, the generality must be content to make the most of that wherein they are placed already.

To effect this, they must understand the nature of every kind of situation, and all the possible advantages of their profession: that piece of ground may be excellent for some particular crops, whereon the generality will not grow, indeed we have now such a variety of useful plants for tillage, that I may boldly say, there is no sort of ground on which some of them will not turn to advantage; on particular pieces where tillage cannot be employed, and

and where no grafs will grow, woods may be planted to great profit; the bees will make advantage of the very dells and old pits, so they be near the house and quiet; and a moderate expence may convert wet places to ponds for fish, which shall supply the market, and drain all the spot about them. The first attention must be to the greater articles; but large profit will also ensue from the least. I shall endeavour from my own practice, which has been in some degree successful, to direct the farmer not to loose one inch of his ground from some useful product; nor one hour of the year from some beneficial service.

Our ancestors omitted many things; for the improvements in husbandry are a new consideration; therefore let no one be afraid of alterations in the disposition of his ground; the more any subject is considered, the better its advantages will be known; and every season, in this article, adds to our knowledge. Therefore let the possessor of a farm look with a considerate eye about him, he will find enough to be done to certain profit; and when he has weighed it deliberately, let him adventure boldly.

Every farm is in some part presented to each point of the compass; and the effects of different exposures, which are so carefully regarded by the gardeners, should not be slighted by the husbandman; the same sun and the same air cherish the corn and the flower, and it will be

easy to apply to the one, what is known of the other. The ground cannot be too much open to the South, South East and South West: on the contrary, the North winds, and blasts of the North East, are hurtful to all tender crops. This will direct him to admit the influence from the favourable quarters, and to defend his ground from the others: and let him first consider this in regard to the whole farm; and afterwards in a lesser degree for each enclosure. Hills are the best defence from the cold quarters; and the next is wood; where nature has given the first, the farmer need be in no care: where his grounds are exposed, let him plant upon the out-skirts toward those points.

We have many trees that will suit every soil and bear every kind of exposure, the planter, therefore, has his choice. He will want timber for his buildings, and utensils for the farm, therefore let him first take care to plant such as will supply him; and then adapt the rest to the soil, the condition of the place, and the demand. The ash is a tall grower and stands the wind well, therefore let this always have a place in such plantations; and let there be such quantity of it, that as much may be cut from time to time as his service demands, without affecting the shelter. We plant oaks for a succeeding generation; but they should have their place always on these occasions. The beech is less proper for this use, because

of its naked trunk; but where the soil best suits this tree, as in light, sandy and very dry ground, it may be made to serve, by an out plantation of some bushy shrubs, to break the wind before it reaches the place.

In all hedges the same rule should be observed, for every enclosure will succeed the better, as it is open to the favourable quarters, and sheltered from the others. We plant timber trees in our hedge rows too generally. In the enclosures of pasture ground they are always proper, but I think I may say from some experience, that in the hedges of land in tillage they often do much more harm than they are worth. The roots of timber trees spread in proportion to their stature, and it is surprising how far one tree will send its fibres; wherever they come they draw nourishment; and though the roots may seem to strike deep near the body of the tree, these fibres always rise toward the surface, and take their nourishment out of the mould which the farmer has enriched by tillage and manures. The food of all plants is alike; therefore these roots take the very nourishment intended for the crop: the more the plough breaks them, the more new fibres they send, and consequently the more the ground is drained of its due nourishment for the crop. This is not minded, but there needs only observation to shew it distinctly. I have seen it in my own grounds, and I have shewn it others, and the event has proved the truth of those obser-

uations. The white-thorn spreads its roots but a little way, and is the most proper fence; the black-thorn, though a small shrub, spreads at the root like a tree, and should never be admitted in the fences of these grounds. In pasture grounds, the hedges may have many trees without damage, for the innumerable roots of the turf will always supply the blade; and they are so superficial, that the fibres of the trees have another source of feeding. One thing, however, I have constantly observed in this respect, which is, that although trees in the hedge rows do not at all impair the quantity of the blade, yet they are unfriendly to the stalk in small enclosures; though the grass grows free at all other times, it has a pooriness in the hay season. The roots of the grass are to pierce deeper to feed the stalk, and there the fibres of the trees interfere with them. These observations are new, but as I can avouch their truth, I hope they will not be less welcome; for they direct the manner of these plantations.

In the hedges of tillage land let there be no shrub but the white-thorn, and no tree whatsoever, except to the north east quarters; and there no kind is so proper as the ash; because it spreads less at the root than any. They should not be trimmed up, but suffered to have some spreading branches side-ways: the fewer will answer the purpose of shelter, and therefore the crop will be the less defrauded of its nourishment.

rishment. For the hedge rows of pasture grounds no tree is so proper as the elm. The grass will not be starved; the turf keeps the mould moist for the roots; and there need be less regard by far to the quarters of the heavens; only in general it will be a refreshment both to the grass and cattle to be open to the morning sun: and the smaller the enclosures the fewer should be the timber trees in the hedges. The white thorn is preferable in these as well as the others for the general shrub: but as there will be a want of the black for many occasions, some of it should always be planted where it may spread at the root with least mischief.

The hedges being finished, it will be proper to consider whether there be any part of the ground that will raise coppice wood. The profits arising from this are very considerable; and it may in some measure be added to the list of changes of the crop. If I am not greatly mistaken, there is a time when all our change of crops will not succeed; the land will be exhausted by these repeated growths beyond the recruits either of manure or tillage; and in that case, the resource must be to lay it down in wood. This roots deep; it stands a long time; it recruits the ground by shade and shelter, and by the decayed leaves and broken rotten branches. So that after the due advantages of the coppice plantation, it may again be brought to go the round of tillage, and

and supply numerous crops to our descendants.

Whether this be the case or not, which long observation only can confirm, there are advantages in coppice wood itself, which may very well recommend it; and there are spots peculiarly adapted to its growth. Ground which is too wet or too dry for corn, will equally bear coppice wood; it only requires choosing the right kinds: therefore if there be at any remote part of the farm a piece of ground that is ill suited either to pasture or tillage, and that is inconvenient from its distance from the house, let this be planted for a coppice. It will require very little attendance: it will supply the farm with utensils and fuel, and will after a few years produce a large profit. The particulars of planting, and directions for the management of these several growths are reserved for another place; we are here directing the general disposition of the farm. One more thing there is regarding enclosures for tillage, which demands a place while we are considering plantations. In general I have observed that too small enclosures are a disadvantage; there are few enclosed farms I have seen where there might not be a great advantage in taking away some of the hedges. It is not only that the smallest enclosures are robbed of nourishment by the roots of the hedge plantations; but that for want of a free air the crops are more subject to blight and mildew. What I have

have practised, and have advised others successfully, is to take down a South hedge where it may be done conveniently; and thus lay two square fields into one oblong one, open to favourable quarters, and as much sheltered from the others, as while they were smaller. After this I usually cut some openings in the hedges down to five foot high, in places where they can be best suffered; which giving passage to the air, together with the enlarging of the enclosures, frees the crop from danger.

The farm being thus planted where needful or convenient, and opened where necessary, it will be time to think what part of the pasture ground to convert into tillage; for there is no old farm but will admit this change with great benefit. All grounds that lie near rivers are by that alone suited for natural grass. This requires more moisture than any plant raised by tillage, and there is a great advantage arising from the power of overflowing these lands at pleasure. These, therefore, being reserved by nature for common grass, the choice falls upon those which be higher; and among these several considerations will fall in, to direct which should be broke up, and which remain in natural grass.

As grass grounds serve the two purposes of hay, and feeding, the care of the cattle will be one article in this choice. Water is necessary for feeding grounds, and for that reason such should be reserved in this growth as are best supplied

supplied with water; and those which are most deficient in this, should be broke up for tillage.

In all high ground which is kept in tillage, there is a disadvantage in the waste of manure from the effect of rains. When these fall heavily, they run off the lands thick, and enriched with the finest mould: what can be done to prevent this we shall shew, speaking of the manner of tillage for such grounds; but as some will be carried off this way, in spite of all possible care, the grounds should be so disposed, that what is carried off from one, should be received upon another, and not be suffered to run upon and enrich a strangers. For this reason I have so laid out my fields, that one plowed land naturally receives what is brought from another; and below the last there is still a piece of pasture ground of my own to detain what has run off from the lowest in tillage. These grounds I manage in the following manner. Whatever quantity of manure is necessary for two such fields, I lay two-thirds of it upon the upper field, and only one-third on the lower. The highest grounds are naturally the poorest, for the reason just alledged, therefore they require somewhat more enriching, and the surplus is to allow for what will be washed off. This will in great part settle upon the lower piece, and by that method the two will bear about equal crops; but there still runs off a part of the fine mould and manure

from

from the lower field : this is received by the
grass ground below that, and there is detained
entirely.

This is the method I have used, and I have
found it successful : I therefore recommend it
to others. Most farms have higher and lower
grounds, and they may thus be always made to
dress one another in some measure. I have
found, that with care in this management, the
farmer will need to lay very little manure upon
his natural pasture ; the benefit of over-flow-
ing, where he has it, answering sufficiently for
the grounds by rivers ; and this drain from the
upper lands for the others.

The proportion of tillage to pasture ground
may be rationally enlarged in this method ; and
all the time care should be taken to lay the
lands together in such a manner that they may
answer in respect of convenience as well as ad-
vantage : there are some growths which re-
quire more and some less attendance ; and it
should be always in mind to have those nearest
the farm house which must be oftenest visited ;
and those farthest off which require least care.
The next caution should be to have the most
ready and convenient way into the several
grounds to carry on the necessary dressings, and
to bring off the crop in the straitest course that
can be to the yard, and with the least waste of
ground. When the farmer has thus laid
out his ground, made good his fences, and
secured water in his pastures, by claying the
bottoms

bottoms and planting water shrubs about the edges of his ponds, he may look upon his farm as ready for his crops, and proceed to their care and culture. That we may deliver our instructions regularly on these heads, we shall divide the subject into four distinct classes: the first, containing corn; the second, useful roots; the third, artificial grasses; and the fourth, natural pasture.

C H A P. II.

Of the management of wheat from the seed to the harvest.

AS corn makes the most important part of the husbandman's occupation, so the most considerable kind of this is wheat. This species, therefore, demands, on account of its value, the first place in our directions; and the preparation of the land, for this being the most perfect of all, it will best serve to explain the general nature of culture. This is an article we have of late improved beyond most other things. Our ancestors gave one year of fallow to their lands, in order to produce two years crops; but the present management gives a crop every year. This we owe to the improvement of tillage, and to the introduction of new crops; and it is plainly of vast advantage: tho' all the crops are not equal in value, the difference between the meanest and nothing

thing is a very great profit to the husbandman, and the wheat comes in its turn full as well as when the land was prepared for it by that absolute rest. The custom heretofore was to sow corn one year upon the ground, the next pease, and the third to lay it fallow: there are places yet where this is done; for common fields are subject to many inconveniences, but the farmer who has enclosed land need not give up a season in that manner.

In these earlier times dung was almost the only manure, and a certain quantity of that being always necessary, the good management of this corn land depended on the quantity of pasture for the food of a sufficient number of cattle. Now we are acquainted with a vast number of other manures, dung is less necessary; and consequently less pasture: especially as we can feed cattle now on the product of tillage land. Some late writers have gone farther, and endeavoured to set aside the use of manure entirely; asserting, that sufficient tillage will answer the purpose. Mr. Tull is of this number; indeed he is the head of them: He affirms, that in his way of husbandry, one piece of ground will bear a good crop of wheat every year for ever, by great plowing, and sowing the corn in rows, placed differently each year. It is needful we should speak of this, and it becomes us to do it with freedom, because it is not true. Good plowing will make less manure serve, but the farmer who expects success should always use both.

In

In France Mr. Tull's method has succeeded, but we are not, therefore, to argue that it will in England; and though Duhamel is an author of credit, he may mislead an English farmer. The grounds of France are in general light, and great part of those, where the new husbandry has been tried, had been in a long state of rest: therefore those trials which have answered so well now will fail hereafter; nor can the English husbandman judge of his own lands by what has happened in these. To have a good crop of wheat he must prepare his ground by plowing, and enrich it by manure: this crop requires great nourishment, and will come to little if but half fed. A great deal of the trouble is saved by raising crops of turneps, clover, and the like upon the ground, which, beside their own value, tend greatly to prepare the land for wheat. In the easiest and most familiar way of management with these the farmer may have every third year a wheat crop, without fallow. For if he sows wheat this year, he may in the way we shall direct, sow pease or oats the next, and clover the following, which will prepare the land for wheat the next again. This is too easy to perplex the meanest capacity, and the success has shewn, that it is every ones interest. If he will go no farther, the variety that is offered by lucern, sainfoin and the like, and the prodigious profit of that plant, which is called the

the new LUCERN, together with the turnep and others, afford, yet greater profit by more change. The farmer may chuse one or other of these as they will best suit his soil; and always be sure of a good crop. This will be explained more particularly under their several heads; but a general view will shew the farmer how many ways he may prepare his ground for wheat. Various plants root so differently; some deep, some shallow, some spreading, some perpendicular, that although the nourishment of all is the same, they will thrive, by the change, after one another; and by this means, with moderate manure and good tillage, the same piece of land will yield valuable crops for a vast succession of years: tho' not as has been thought for ever. One thing more it will be proper to observe in general, and after that we may enter on the particular directions for this grain. It is, that although a wheat crop may be raised every third season, yet it will be better that it be allowed but once in four or five. The produce will be much greater, and the land will last longer. It is not the interest of the land owner to have all produced that possibly can be upon his ground for a few years, and to leave it exhausted; which is the effect of forcing crops; and will always be found sooner or later. The real benefit is to use such methods as will continue profitable. For want of a due attention to this, what has appeared advantage, has been

in reality destruction; and societies who meant the improvement of their country, have given rewards for what was detrimental.

No instance has been more spoken of than the Irish prize obtained by Mr. Yelverton; but very few have considered it sufficiently. The society of Dublin intending to promote the culture of wheat in that kingdom, offered a reward to the person who should produce the largest crop upon a certain quantity of ground. This gentleman chose an excellent piece of fresh land, and prepared it by burning; a practice which always impoverishes land for many succeeding years; and is, therefore, never used except for the very worst. By this and all the other known methods used together, he raised a vast quantity of wheat upon the ground, and obtained the prize, with great honour. But what would be the condition of that piece of land afterwards? it would be useless for many years. What would have been the consequence if all the good land in Ireland had been used in the same manner? the country would have been impoverished for a long series of time; and the society, who meant to enrich, would have impoverished the nation. Where so many heads were overseen, one easily may. The case is the same with a private estate; and a whole kingdom, in this respect. A landlord would not suffer practices so plainly prejudicial to the ground as this; but many things may be done in a lesser degree, which though they

seem advantageous for the present, will prove really prejudicial. The purpose of this work is to direct a contrary course; and to lay down those methods which shall tend at the same time to produce large crops, and keep the ground in good condition. It is on this plan we shall begin with wheat; delivering the methods by which it will yield the most profitable crops, and least exhaust the ground.

More tillage is required for wheat than for any other crop; and with this there must be allowed a proper quantity of manure. This is a subject upon which farmers often commit great mistakes: the ground can never be too fine for wheat, but it may easily be too rich with dung. When the land has a great deal of plowing and moderate enrichment, and the corn is sown early, the produce is a large crop with short straw and a full ear; but on the contrary, a great deal of dung and late sowing feed the stalk, but the ear does not come to a good condition.

Tho' dung is the most common manure for wheat land, yet in most cases it is the worst of all; the virtue of it being irregularly conveyed to the ground, and it being always productive of weeds. Marle, where it can be had, is the best; the most excellent and most lasting: lime and chalk are also excellent; and there are others suited to peculiar soils, of which we shall speak. Five plowings should be allowed to break and prepare the land for

wheat, and these should be done in dry weather always. The depth of the soil will direct how deep to plow; for all the good mould should be turned up, and none of the bottom. We shall speak hereafter of the drill and horse-hoeing husbandry; which however recommended for wheat, are, perhaps, less suited to that corn in some cases, than to many other crops. We treat here of the common way of plowing. The method of plowing in stiches, succeeds better for wheat than any other. Five stiches may come into a perch for sowing, with a thorough a foot wide between every two. This way makes the soil very fine, and gives an opportunity of sowing the seed regularly, which is the true practice. This method is of the nature of the drill husbandry; and perhaps it is better for wheat than any other. Great care is to be used in sowing the seed even; and a small one horse plow should be drawn afterwards along each furrow. This throws up the corn that fell there, and the finest of the mould with it upon the stiches. I have seen many methods of sowing wheat; but there is none which succeeds so well as this. If the ground has been well prepared by the former plowings, and has received the due benefits of the air, it will now be rich and fit for service, and lie close to the roots all winter.

The choice of the wheat will depend upon the nature of the land: a great deal rests upon chusing a kind proper for it; but this is
not

not sufficiently regarded. The most profitable wheats require the strongest soils; and where the land is of another kind other seed must be used, for the large sorts of wheat will not be nourished.

If the land be firm, strong, and naturally clayey, but well dressed by manure and tillage, it will bear the RED LAMMAS WHEAT, which is the finest of all. This is the wheat which yields that fine flour called Hertfordshire white; and is in many respects superior to all other kinds. It is called RED because of the colour of the stalk and ear, which have a red-dish cast: and even the skin of the grain has the same; though the flour be so perfectly white. Every part of this wheat is valuable, the stalk grows five foot high, and affords the highest priced straw. The finest and soundest of this kind of wheat is to be chosen for seed; and it should be the growth of some distant county: the finest in the world is produced in Bedfordshire; but the farmers there find an advantage in changing with others for their own sowing.

If the farmer is about to sow a piece of ground, which is loamy but rich, or one that has a blue clay at the bottom, but a good black mould above, for these sort of lands the fittest seed wheat is that the farmers call Pirky wheat. This is the next in value to the red Lammas, and often excels it in the crop: but that is when that kind has been sown upon

a land of an improper sort. In that case the kernels of this will exceed those in weight and size, which is not their natural character. The farmer may learn from this, that it is not the finest kind, but that which is best suited to his ground, that will yield him the largest and best harvest. The Pirky wheat has a white straw and white ear; but it is red on the skin of the kernell. The skin of this corn is very thin, so that it yields a great deal of flour and little bran, which recommends it greatly to the mealmen.

If the soil be gravelly or chalky, the proper seed wheat is that kind called YELLOW LAMMAS. This is, when properly managed, the third in perfection; and on such a soil as is here named, will yield more than either of the former: For this kind of ground would not be able to feed the red Lammas; and it would but poorly supply the Perky kind: Therefore this Lammas with a full ear, will answer better than either of them in such land. It is necessary to be particular on the subject of the wheat for these soils, because in many places they are getting into the practice of sowing the Pirky wheat upon chalks and gravels: those who do it always suffer; for although the Perky be a wheat the mealman prefers to this, yet the quantity does not answer, nor is the ear ever full. The yellow Lammas is known by the whiteness of the straw and redness of the ear. The skin of the grain is apt to be thick,
but

but the flour is excellently white, and there is a great deal of it in the grain. All wheat for seed should be brought from another place, but this caution is more needful for the yellow Lammas than any, for if raised two or three seasons upon the same ground, the corn grows so small as to be poorer than any kind.

If the soil be a poor light loam, enclining to sand, the kind of seed that should be chosen is the WHITE WHEAT. In all these instances the soil is understood to be prepared by manure and tillage, and in that case this sort of ground will support a crop of white wheat very well, and make a great return at harvest. The white wheat has a white straw, and a thick ear, which is rough when near ripe, by means of the ends of the several husks that cover each grain. This is a hardy and strong wheat in the growth, and is less subject to accident by blight and mildew than any other. The skin of this wheat is a pale yellow, the grains are large, sound and heavy, and they yield a great deal of flour and little bran. Of late many have tried to raise this kind in stiff damp soils, but however it may have been recommended for this use, 'tis wrong to do it. The wheat will not be the same when it comes to the growth; the ear will be thin and smooth, the corn less, and the rind so brittle, that it will break in with the flour in grinding. The millers know this, and the smooth white wheat is, therefore, out of repute. The farmer must not

wonder that a wrong soil can thus change the nature of the seed: all these fine kinds of wheat have been produced by good ground and careful management from the common smooth white wheat; and they will all degenerate to that state again, if they be not supported by the same care and management.

If the land lie so that the soil will be wetter than suits the generality of wheats, there is a singular kind which will answer, this is the **DOUBLE EARD WHEAT**; it requires a stiff soil to keep it upright, and more moisture than the others. The straw of this is white, the ear yellowish, and the corn also yellowish, but with a dusky cast: it affords a great deal of good flour, but not equal to the preceding kinds. The danger is of its lodging: for the weight of the ears is often too much for the stalks; but in the soil we have named, this rarely happens; and it may always be prevented by sowing early. There are other kinds of wheat sown in some places, but they are inferior to these: and as one or other of these will suit every soil, the farmer should look no farther: only let him observe the universal rule of purchasing them when for seed from a distant place; and take care to deal with an honest person.

The seed corn being chosen, the next care must be to prepare it for the ground by steeping. If sown without this caution, it would make the first shoot weak, and be liable to many

many accidents. This method of steeping impregnates it with salts, which strengthen the first efforts to grow, and being covered with lime after the moistening with these ingredients, it goes into the ground very well defended against those little devourers which would else feed on it when it grew soft for shooting.

There are many ingredients prescribed for this purpose, but the receipts seem to have more of fancy than of reason in their contrivance. Salt is a general ingredient; and 'tis said the origin of the practise arose from finding that corn wetted by chance with sea water, grew better than if no such accident had happened to it. Leisure and curiosity have led me to try many of those celebrated receipts for steeping corn; and I have set down the success. My trials have not been in spots of a yard square, as philosophers make experiments, but at one season or other I have used the several receipts to the corn of a whole field. The result of such trials must be useful, and I shall in this plain way give them to the reader. First, I shall mention what ingredients have been proposed for this service, and what effects I have found from them: I shall then give the receipt of the liquor I use, which is founded upon these experiments: and for the service of those who may not chuse this, I shall add that which is commonly used in our best corn counties.

The

The ingredients which have been used in the liquors for steeping corn are these: common salt, urine, copperas, alum, lime, arsenick, and dunghill water. The efficacy of COMMON SALT is certain, and no harm can arise from the use of it; ALUM does not so much promote the first shoot, but it perfectly well defends the corn from insects, and strengthens the plant; urine is a filthy and unnecessary ingredient: The taste of these liquors does not go up to the corn, but there is something displeasing in the thought: it is like the manuring corn fields with human excrements, which though a rich dressing, are for this reason altogether disused. Copperas is a hazardous ingredient; for if the corn be steeped so long in a solution of it, as to let the liquor get at the young shoot, it will weaken if not destroy it. This is confirmed by all kind of experience. Corn has been damaged by long wetting in it; and it appears by the experiments of Dr. Home, and by what we see about iron mines, that iron is of all things the greatest enemy to vegetation: now copperas is the salt of iron. Nevertheless there are uses, and those very essential, which it may answer in this purpose; for where there is great danger of insects, this will prevent their eating the corn more than all other things; and when the liquor has not reached the heart of the grain, it can do no mischief. The good effect of lime is certain, and it can be attended with no ill consequence

consequence whatever. The use of dunghill water is also right, for it is rich with the best particles of the manure, and will promote the first growth. The last ingredient, arsenick, is so strange and unnatural a one, that 'tis hard to say whether the ignorance or boldness that directed it were greater; arsenick cannot easily be dissolved in water, therefore it will, perhaps, do no harm, but for the same reason it will do no good; and if it were capable of being readily dissolved and introduced into the corn, who can say that it would not be destructive? the least part full of such a terrible poison, certainly, would be able to do great mischief. As it is, there can be no reason for throwing poison into the ground; and from one instance, which I saw about four years ago, it seems that mischief may arise from it when least expected. A farmer not far from hence, being told that arsenick had great effects in this respect, added some to the liquor in which he steeped his corn, and sowed the grain with the thick liquor about it, only crusted with lime. Whether any harm happened from the flour is hard to say, and I rather believe not; but thinking it proper to eat off the shoot, the sheep which he turned in for that purpose fell into a disorder that carried most of them off very suddenly. I do not suppose the leaves were poisoned, but sheep bite near the ground, and they might get at some of the arsenick which lay there, or had been raised with the shoots;

shoots; for as water does not dissolve that poison, it would lie long upon the ground.

From this plain account of the nature of the steeping ingredients, it will be easy to see, that in general they have been injudiciously used; and as some are intended to promote the shoot, and others to defend the grain, while soft, from vermin, it is plain that one of these kinds need not supersede the use of the other; but that if the corn be steeped a considerable time in those ingredients, which are meant to promote its first growth, and some of those be afterwards added which tend to strengthen the plant, and to preserve the grain from insects, this, and this only, will be the rational way of having the full advantage of the practice.

For these reasons, and upon the result of some experience in the several kinds of ingredients, I have long since invented the following method, which I have used with success. Get a tub with a tap at the bottom, and put into it a quantity of water, enough to wet the seed, putting one gallon of the red water from a darghill to every three of common water; dissolve so much sea salt in this as will make an egg swim upon it: this must be put in by weight, and then two thirds of the same quantity must be added more. This I have found to be the best proportion of salt to the water. This being ready, throw the seed wheat into a large vessel of fair water; stir it very well about, and then skim off the light grains which swim

swim at the top: drain off the rest of the water, and put the seed wheat into the brine. Let it stand twelve hours. Then dissolve some allum in common water: the right quantity is one ounce of alum to every gallon of the brine; if there be a pound of allum, it will require a gallon and half of water; dissolve this over the fire, and let it stand to be cold, then put it to the brine. Last of all, when this has stood eighteen hours, add to it as much green copperas, dissolved in warm water, as there was alum. Let the whole stand eight hours more, then draw off the liquor from the tap: spread the moist corn upon the floor, and sift over it some flaked lime; enough to cover it. This is to be done late at night, and the next morning it will be ready for sowing.

This method I have now used some time, and I am satisfied I shall never use any other. Much less seed serves this way than in the common method of sowing; for scarce one grain in a hundred comes to any accident: the corn is secure from vermin while it is swelling in the earth, because the taste of the copperas is what no insect can endure: the first shoot is made strong, because the salt enriches the ground all about it, and even the moisture it for some time receives comes impregnated with it: after this the effect of the alum lasts, for it strengthens the first fibres, and this continues during the whole growth: thus there is every reason that can be to expect a good produce.

A man must be very cautious in speaking any thing on this important subject from a few examples ; but so far as I have seen in the effect of these things I shall relate: future observations will probably confirm the truth. Whenever I have used alum in the steeping liquor, I never saw that crop lodge, tho' the ears have been heavy, and the season unfavourable, the stalks have kept upright. Having always seen this when allum was used, I am inclined to attribute it to that ingredient, which is in all respects observed to give strength to the plants. I recommend the receipt here given to all persons: but as there may be some who chuse to go on in the common way, I shall for the use of such add the usual practice. The receipt is this:

Dissolve in water as much salt as will make an egg swim, then add so much more: stir this up, and then put into a common tub of it two pounds and a half of alum beat to powder: stir it up, and put in the wheat; let it stand five and thirty hours, and then draw off the liquor, and sift lime upon the corn as before. To steep more corn, add fresh ingredients, and thus go on till all is done. There is no doubt of this succeeding, for it is the common practice in our best corn counties; but having tried several times this and my own together, I must say mine had the preference each crop.

The

The success of Mr. Yelverton may lead some to follow his method of steeping: it was this. He put stone lime and bay salt into urine, without any water, and when the liquor had stood four and twenty hours he drew it off, and steeped the corn in it twelve hours.

There were so many other advantages this gentleman's crop had, that 'tis impossible to say what particularly was due to this in his experiment; but beside the disagreeableness of the liquor, I think, to speak freely, it did little in the affair, because the corn was not long enough in it to answer any great purpose. I have tried it more than once, and have found, that with a little time steeping it took scarce any effect, and when the corn lay in it a long while, the blade grew brown soon after it came up. I think it safe to say the common receipt is much better; and for my own part, I shall always prefer the first here given to both of them.

The corn being frosted over with the lime, is to be delivered carefully to the ground. The manner of sowing we have given already; and shall only add, that there is a great advantage in sowing upon the ground when fresh broken: therefore let the severall articles be considered together, and the field be just ready to receive the seed when that is in the right condition for sowing.

When the corn is in the ground, and a small plow has been carried along all the furrows,

rows, as we have directed, they will be clean and free for the discharge of water, and nothing is required more till the blade is up. It will then require to be managed differently, according to its condition of strength.

If the crop come up in a midling way, and be neither too poor nor rank, all that need be done is rolling the ground. This should be done with a light roller in damp soils, and with a heavier in dry: the effect will thus be proportioned to the necessity; and this practice is always an advantage; for it is very essential to wheat to stand firm in the ground; and it will not, unless it have this or some such assistance. The surface having been broken by the passage of the numerous blades, will be loose about the rising stalk, if it be not this or some other way pressed together.

When the crop is too rank, the right practice is to mow it. The feet of the mowers will in this case sufficiently answer the purpose of the roller, because the corn in this strong growth rooting deeper, has less occasion for that help above.

On the contrary, when the crop is poor, the right method is to put in sheep to eat down the blade. This at once has the effect of fastening down the mould to the roots of the young crop, and of enriching the earth by manure, very largely given to the surface of the mould by these creatures. Their dung and urine are very rich; and the perspiration of their bodies is
more

more than all. In the course of their feeding, they will lie upon most parts of the ground, and their dung will fall upon the whole; and the crop will spring with a new vigour after them.

If after this it wants refreshment, which is seldom the case unless from very bad management, it still may be given by a top-dressing of some of those light and rich manures, which act in very small quantities; and readily wash into the ground with the least rains. Of this nature are foot, pigeons dung, hogs dung and the like. The way of applying these is by sprinkling them by hand, as corn is sown: and the best time for it is, when there is a calm day, and a likelihood of rain; for wind would blow these light dressings off the ground, and a scorching sun would parch them up without the least benefit to the crop.

In this way the farmer may safely bring his wheat crop in a good condition to the beginning of summer. Then arises a new trouble which is that of weeds. The earliest cure is best; and the right choice of manure often prevents this accident. Lands, which are dunged, always are subject to weeds, for their seeds are brought in with it: but where lime, marle, or the like manures have been used, there are few. This is a reason for preferring them, for the trouble and damage of weeds is excessive.

D

When

When these sweet manures have been used, one weeding by hand will perfectly well clear the ground: this must not be done too early in spring; but when the crop has some growth, and the weeds are large enough to shew themselves. The pulling them up at that time in some degree breaks the ground, and as they will be but few, if careful people are employed, the corn will get a great deal of good, and scarce any damage.

When dung has been used, the weeds will be too many to get up by hand: the hoe must be employed; and though some expence attends this, yet the advantage will very well repay it. Careful hands must be employed, and the hoes must be small. The effect is not equal to that of hand weeding, which pulls up the roots; but if the corn grows strongly after this, the weeds will not get up again to do it any harm. If the weeding be done too early in spring, there will be a fresh crop of them again in summer; and if it be let alone till the corn be strong in the stalk, the injury, it will get by being trodden upon, will not be recovered again. Therefore the time is very necessary to be well fixed; and the best season of all is, when the wheat is somewhat grown, but yet will bear a hurt and recover. In all this account we have treated of corn sown in the usual way: when it is planted by the drill with small intervals, the weeding is much easier, and may be done at any time without damage

damage to the crop. When the intervals are large, and the ground is intended for horse-hoeing, that practice takes place against these annoyances effectually.

Having gone thro' the care of the crop in the usual way of sowing, it may now be proper to mention this new method of drilling, both as used alone, and in conjunction with the horse-hoeing. The drill husbandry consists in a regular manner of sowing by means of a plough with a box, which delivers the seed as it goes. The plow opens trenches of a regular depth; the seed is dropped into them from the box in a regular manner; and there is a kind of harrow behind, which throws in the mould and covers them. By this method the wheat is sown in rows, one, two, three, or more together; with such intervals as the farmer pleases. There is the convenience of going to weed, and there is a part of the ground left unoccupied, and consequently unexhausted, and fit for receiving the crop next year. A field of drilled wheat has a prettier aspect than one sown in the common way; and it is much easier managed. The question remains whether an equal piece of ground produces this way a larger crop. The friends of the new method say it does greatly: I have tried, and think it does not: and I believe any other unprejudiced person who has made the trial will say the same. If the design be to do entirely without manure, to be sure the way of sowing in rows and leav-

ing intervals, puts the ground in the best condition for the next year: but why should we want to do without it? lime is cheap; we must have dung because our work cannot be done without cattle; and in many places marle is to be had for digging. Therefore we are sufficiently provided for the common method; and I do not see the advantage of the other. 'Tis said less seed will do in drilling: but this is at the most no great consideration. Less seed, than was heretofore used, will also do in the way of steeping and sowing here recommended: perhaps it will require a little more than by the drill; I usually allow somewhat more, but this difference is of very small consequence.

When Mr. Tull's method of horse-hoeing is used together with the drill, the wheat is to be sown in double or treble rows, and spaces are to be left between every three and three, to admit the horse-hoe, which is a kind of light plow, made for the service of turning up the ground and rooting up weeds. In this way a great deal of the ground is left vacant, yet the corn in the rows being very well nourished, the crop will be nearly large as if the whole field had been covered with it in the usual way. They, who favour this method, say much larger; but I have not found it so. There is a considerable expence in the horse-hoeing, but it prepares that part of the ground for another crop: and upon the whole, to speak as becomes an impartial man in a point of this importance, I think the
the

the curious may amuse themselves with this kind of tillage without loss; and that where there is a scarcity of manure, it may be very beneficial. As to the common course of things, I believe the farmer would seldom be gainer by it: I have heard of two or three who ruined themselves this way; but I never heard yet of any body's profits. As to those who have hurt themselves by it, I believe it was their own fault in not doing the whole properly: for there does not seem any reason to fear its commonly succeeding near as well as the other; and for the sake of those who may be inclined to raise wheat this way, I shall add the method at the end of this chapter. The wheat should be drilled in double or treble rows, and these rows should be seven inches asunder: then between every set of rows, there should be an interval of five foot. Mr. Tull has advised in many cases much larger intervals than these; and has gone so far as to say, that the larger the intervals are, the greater the crop will be: but larger than these are not necessary, for the hoe plow may work very well in these; and the other assertion is absurd.

Having given this fair and impartial view of the drill and horse-hoeing husbandry, we shall return to our crop in the common way; which, after the management here directed, will need no other care till harvest. The time of cutting the corn is one of those articles, which are very important, and not sufficiently understood. The

farmer will say he can see when his corn is ripe ; but it never is ripe all together : and if it were, the best way is to cut it a little before. Corn should always lie some time upon the ground, and in all this time it continues ripening. While the weeds fade, the ear fills : the new-cut stalk receives some nourishment, and for a certain time the dews get into the ear and swell the grain. When the corn is suffered to stand till full ripe upon the ground, the chaff and the straw will be dried up till they are worth nothing, and in the fine wheats these are articles of consequence. If the grain itself got any advantage the while, this would be of the less consequence ; but it really suffers as well as they. We can never be sure of the weather in this uncertain climate ; and for that reason, if there were no other, we should beware of letting wheat stand too long : for when it is cut before full ripe, wet will do it no harm ; but when full ripe a great deal. If the wheat crop be blighted, it should be cut still earlier ; for the grain will in that case get no good while the corn is standing ; but it will be swelled and improved considerably while it lies upon the ground. In the same manner, when a crop is full of weeds it should be cut early, that there may be time for their withering without the corn getting damage. These are articles of consequence and were early known, but they are now too little minded : the good condition of the corn often depends upon

upon them as much as on all the former care together. When the corn is cut it should be let to lie some time upon the ground, for it will get nothing but advantage. The hotter the season is the more damage there is in letting the corn stand to be too ripe on the ground ; for it the easier gets damage.

When the corn is fit for carrying in, the greatest care must be to lay it so as to be secure from vermin. The custom was to put it up in great barns, but experience has shewn us now, that it keeps sweetest and most secure in large stacks out of doors. The best way of securing it is by raising the stack upon cap'd stones ; the capstone being considerably broad, so that nothing can creep up the other and get over it. It is an error to make these stacks square, for the wind and wet have power upon the corners : it is as easy to carry up the stack round, and then nothing hurts it. Corn will be safe thus many years from vermin and from weather.

As soon as the corn is stacked, let it be thatched ; or if there are not hands to spare for that work, it must be secured from the weather by a moveable cover. The damage, which is found in a stack of wheat long after, is usually owing to this neglect at first.

All that remains now, is the thrashing of the wheat, and this the labourer sufficiently understands : but 'tis the farmer who is to chuse the time ; and his business will succeed

much the better, if he never attempt this part in wet weather. Warm dry weather is the best, the next to this is a clear frost: the grain comes out of the husk easier and better. All that remains is the cleaning of the corn, and no care should be spared to do this effectually. The farmer will have credit in his profession; and the wheat will bring a better price at market. The beginning of the cleaning should always be by a long cast, from one end to the other of the barn, and it should be finished by the fan.

Having thus delivered the general and most profitable manner of cultivating WHEAT from the seed to the barn. I shall add in a succinct method, the raising of it by the drill and horse-hoe, or what is called the new husbandry; with the advantages that have been found to rise from it in France, under the care of Mons. Duhamel and others: That the farmer who cannot command manure, or who chuses to follow this new practise, may exactly know how to perform it; and what, if all circumstances favour, he may expect from it. The old husbandry prepares the ground thoroughly before the seed is sown, and can do nothing more for the crop, or at best very little more: the horse-hoeing method prepares the land as well in respect of tillage before the seed is sown, but without manure; and it continues to dress the soil afterwards, while the crop is growing: making it in this case also serve the purpose of

of manure. The longer any plant remains in the ground, the more good it will receive by this assistance; and 'tis, therefore, we shall advise it to all persons for the culture of saint foin, lucerne, and the like permanent plants: for the same reason it is more suited to the raising of wheat than any other of the corn kinds, wheat lying by far longer in the ground than the rest. Yet I cannot universally recommend the practise even for that species. More has been said in favour of this husbandry than is true; and he will deceive himself, perhaps to his ruin, who adopts it entirely: yet in certain cases, and with a due choice of ground, it will be sometimes preferable to the other.

To cultivate wheat in this way, according to the best method, the land having been got into a good tilth, must be laid up in beds of fifteen inches broad, with a clear space of four foot and a half between one of the beds and another. The beds must be raised as high as the mould will well allow, and they must all run at equal distances one from another. On these beds the wheat must be sown in two or three rows upon each bed; and the interval must be at times plow'd deep, with the hoe-plow or horse-hoe as it is called. 'Tis affirmed, that a field thus managed without dung, will yield a larger crop than one of the same kind, and bigness manured in the usual way. This from some trials, I doubt is not generally true; but

I believe that this culture with a very little dung, will produce as large crops as the common husbandry with more: and that for this reason, it may be in some cases useful.

When the harvest is over in such a field as this, a new crop of wheat may be raised immediately in it, by plowing up the middles of the intervals into new beds, such as the first: and it is affirmed by those who are fond of this method, that it will be equal to a crop of the same grain upon land which has lain fallow: but neither do I think this will fully answer upon experience. However, the tillage in this method, will supply the place of manure in some degree; and the intervals, with a little dung, will be fit to plow into beds for another season. This method with the help of change of crops, and the other advantages of common husbandry, it will be serviceable in some instances; and therefore should be understood by every husbandman. In preparing the land, the first step is to plow a deep furrow in the middle of each alley, and afterwards the whole is to be levelled and harrowed fine, then the beds are to be raised where the first furrows were plowed, and the intervals to be left as in the first disposition. The sandy soils should be sown soon after harvest, the clayey somewhat later: but the latter end of October is the latest any should be sown, for whatever is said in favour of this method, it must be allowed the corn grows slower than where there is dung; and consequently

quently the harvest will be late, unless it is got in very good time into the ground. The lighter the land is, the more seed must be allowed to an acre; and the deeper it must be sown. The drill plow will sow the wheat in a regular manner, and the best way is to let in three rows upon every bed. The rows may be closer when there are few weeds in the ground, and the farmer always knows the state of his land in this respect: yet, perhaps, even in this case, eight inches is a better distance than less. When the ground is foul, the rows should be a foot asunder to give a good opportunity of weeding between them. In land very subject to weeds, there should be but two rows of wheat upon each bed; and in such as is very clean, rich, deep and in good order, there may be four rows on each bed, giving the beds more breadth in proportion. The season of sowing should be when the earth is a little moist; the plowing always when it is dry.

The ground is to be thus left till the wheat is up, and has four or five leaves from each root. This is the direction for the first horse-hoeing. The hoe-plow is then to be brought into all the intervals, but it must not come too near the beds, for fear of exposing the roots to the cold. This hoeing leaves a ridge in the middle of every alley; and thus the ground is to be left all winter. Early in spring the horse-hoe must come in again, and in this working of the ground, the ridge, which has been mellowed

mellowed all winter, is to be levelled and thrown toward the bed on each side; therefore after this hoeing, there is again a furrow in the middle of each alley, as there was in the first preparation of the ground. Care must be taken in this hoeing, not to bury any part of the crop; and in any place the earth falls over the plants, they must be cleared by hand afterwards.

After this the horse-hoe is again to be brought in, as often as large quantities of weeds appear; or as the crop seems to want nourishment. The more weeds there are, the oftener the land will require hoeing; the tougher the soil is, the more hoeing it will also require; the less the ground was prepared before sowing, the more of these hoeings it will require afterwards; and in fine, whenever the surface of the earth appears hard and solid in the intervals, it requires to be hoed again, chusing always a dry day for the purpose; and rather delaying it a considerable time, than doing it in wet weather. When the crop is young, the hoe plow is to go deepest near the beds; but when the plants are more grown, it is to be deepest in the centre of the alleys. The field should always have one horse-hoeing when the corn rises to stalk; and certainly another when the ear is form'd, and the grain begins to fill. In land that was before in order, these two summer hoeings, with the winter and spring hoeing before directed, will be found sufficient; that

is four to the growth of one crop; but in tough, poor and weedy grounds, there will be required one or two more during the course of the summer. Thus a very considerable quantity of wheat may be produced upon indifferent land, without the help of manure; and this at first sight pleases the imagination extremely: but there is a very plain draw back; for the expence of tillage is much greater in this way than the other: these two articles are to be counted up together, before we form any judgment upon that head. There are also many other specious arguments of a like kind, which come to nothing, or at the best to very little, when ballanced against others. I propose to warn the farmer against being deluded by false shews, and at the same time to set before him what is the real advantage, where circumstances concur to favour the use of this method. It is certain, that wheat raised by the horse-hoeing husbandry in good land, will grow so strong that each root shall send up thirty or five and thirty stalks, whereas it would but have sent up three or four in the common way: and all these stalks, or nearly all, shall be crowned with fine and full ears; whereas it is plain that in the common husbandry, many of the stalks are in a manner barren. This would seem to give a vast preference to the new method, but we are to count against this, how small a number of plants they are upon an acre in the new way, and

and how vast a number in the other. This will reduce the first seeming advantage to nothing, or perhaps the ballance will be on the other side; for though there are ten times as many stalks from each root in the new way, as in the old. There are at least ten times as many plants raised upon an acre in the old, as in the new method: therefore the advantage is not to be sought in this number of stalks from a root, but in the quantity of corn in each ear. In this point, it is certain, the horse-hoeing husbandry has the advantage: for the ears are longer, larger, and better filled, than in the common way of growing. But then we are to examine by how much the number of ears, such as they are, in a common crop, exceeds that of the new method. The farmer will see by this, that many articles are to be brought into the account, and that 'tis easy to be deceived, when they favour the subject, who make the representations. If we counted the number of grains produced by each grain, in the new and old husbandry, the answer would be vastly in favour of the new: but this is fallacy; for a much smaller number of grains are sown: the other fallacy, in regard to the number of stalks from one root, which is of the same nature we have explained before: and upon the whole I am persuaded, that an acre of ground will produce about as much corn in the common way of management, as it will in the other. Even Duhamel himself, however
highly

highly he is inclined to favour this method; allows, that there is not any great difference in favour of the horse-hoeing method, in the produce of equal quantities of ground. 'Tis for these reasons I have said, that in general, the farmer will do best to raise his wheat as his ancestors did before him; only adopting the turnep, and clover: but there are still some real advantages in favour of the horse-hoeing method; though these which have been so much boasted, are but imaginary. In the first place, wheat may by this method be raised, if not every year, as is said, at least much oftener in a course of years, than it can in the common method upon one piece of land; and secondly, it may be raised without manure. Therefore where labour is cheap, where wheat bears a price, and where manure is scarce, if the land be of a favourable kind, this will be the most beneficial kind of husbandry. The fitness of the soil is a very considerable article, for where it is unfit, it requires more labour. Therefore the same corn will cost more on one kind of ground than on another, and this is to be entered as an article of the account. In light, deep, and clean ground, where four hoeings are sufficient, that method may be profitable, which will be disadvantageous when seven are required, as they will be on some coarse, tough and foul lands. All fallowing is saved by this method; but that is not to be reckoned into the present account, for the fallowing may also be saved in the

the common course of husbandry, by the change of crops. But as the same piece of land will bear wheat oftener this way than any other, the advantage will be found by fixing the real number of crops, and computing the expence. It is said the same land will yield wheat every year, and the crop be larger every year than the last: but the farmer must make his computation from what he sees in nature, not in books; for if I may judge by a few experiments, this assertion, though made roundly, and repeated boldly, is not exactly true.

It has been said, that the culture of ground by the horse-hoeing method, is cheaper than in the old way; but there is also a fallacy in this. 'Tis true, that an acre cultivated by the horse-hoe, and an acre in full culture the other way, are nearly of equal expence; but the land is in full culture always in the horse-hoeing method, whereas in the common way, there is little or nothing done to the land all the time the wheat is growing. Therefore we are to count whether the frequent raising of wheat crops, will or will not answer the extraordinary expence of this continual tillage. Thus is the whole boasted advantage of the horse-hoeing husbandry, reduced to this plain account: the expence is really more, and the only benefit is the having more crops of wheat from the same ground, than could be obtained otherwise. It is certain, that many more crops of this valuable grain, may be obtained by the horse-

horse-hoeing husbandry, than by the common; and that the produce of each will be nearly equal, perhaps wholly equal, or something more than equal to a crop raised in the common way. Now computing the superior value of these wheat crops to those of any other kind, the frequency of their return will, under the favourable circumstances I have named, make the farmer good amends for the expence of labour, and some manure into the bargain. But there will require a course of years for him to reap the advantage; and if he rashly sets about this practice with improper land, where manure is plentiful, and labour dear, he will probably ruin himself.

Whoever shall think of practising the new husbandry, will find a great advantage in raising the ground into beds, in the places where the corn is to be sown. The first practice was only to drill in the wheat upon the level surface in distant rows; but this does not succeed nearly so well as the raising that part of the ground into absolute beds. This is easily done in making up the ground; and the only direction needful to those who are not accustomed to this method, is, that they may make the beds highest, which are to have the fewest rows upon them. Thus when the ground is so excellent, that four rows of wheat may be sown upon each bed, these beds can be raised but to a small height above the common surface;

to

E

face;

face; and then amends must be made by deep plowing. In lands, where only three rows of wheat are to be sowed together, the bed may be so much the higher; and higher still where there are only two. Finally, in a field prepared for turneps, where only single rows are to be sown, the beds may be raised in a high ridge; and as the making up of beds is found to be greatly preferable to the flat sowing, so the higher the beds are made, the more will be the advantage. This depends upon a very plain and certain principle in husbandry, which is, that the more any soil is exposed to the air, the greater will be its fertility: to which we may add one article farther drawn from the vegetable œconomy, which is, that plants never thrive so well as when the head of the root is within a certain measure of the surface. Now both these purposes are answered by the raising the ground in beds. The absolute head of the root has some communication with the air, tho' it be at a certain depth from the surface of the bed; and from this place it can send fibres upward or downward as nature requires. In respect of the fertility that is obtained by laying land in ridges, we see it every day in ground trenched in gardening; and fallowed by the plow. The advantage is always greater in both these cases, in proportion as the ridges are higher. The farmers in this neighbourhood keep sheep in folds, whose fence is a high bank of

of earth; and they find the earth of this bank always a rich manure: they attribute this to the vapours from the bodies of the sheep; but I have seen from experience, that any bank of mould, which is placed to the east or south, becomes a rich manure; whether cattle are kept within the place or not: and I have this year found that even the surface of banks of clay, when they stand to the South, becomes a rich manure. We suffer this to moulder down into the ditches, where weeds grow rank upon it; but the fences would be better kept up, if a ditcher pared it off at a due time, and made up the bank, and what was thus pared off was used for manure. The depth of the furrow, which is made in the first plowing of the land for this purpose, is also a great article; for this joins with the height of the bed, in giving the plants a great deal of fine, loose, and well wrought mould for their growth. It is always filled up carefully, and the bed raised over it; and though this settles a little with the weather, the only effect is fixing the mould better about the roots, while there is still free soil enough for the first fibres to spread in any direction.

In the horse-hoeing husbandry for wheat, the deeper the plow goes, provided it does not reach beyond the depth of the soil, the greater will be the crops; but this must be understood with proper regulations. The careful farmer should not attempt it at once, but by very slow

degrees. If he finds his ground has five or six inches depth of good soil, beyond what the plow had used to reach, he must begin by setting the plow so as to cut up one inch of it; and the next year an inch more; and so on till he has got into the full depth of the soil. By this means every year's crop will have the advantage of a certain moderate mixture of this new mould, which will serve as a manure to the rest, and will assist the culture in producing large crops: whereas if he should cut thro' the whole at once, he would turn up a whole body of new earth to the surface, which having lain at a depth beyond the influence of the sun and air, would not be yet fertill, tho' it had all the principles of fertility: for the influence of the seasons must conspire with the labour of the plow, to mellow and break it before it can feed plants. This has been found of late in France; where farmers turning up an upsun'd load of new earth, found very poor crops, though they followed the new husbandry with all possible exactness and care; but a few seasons more with less help of labour, would raise crops from the same ground. In all the horse-hoeings, the weather should be consulted, for little good would be got by them, if performed in the wet. The heat of the weather will assist in the improvement; for the intent is to break the soil as fine as possible, and the hot sun, coming upon a new turned

turned up and dry land, calcines the surface, which is of all ways of breaking it the most perfect. We know that clay itself, calcined by a moderate fire, becomes a kind of brittle earth, and is not only rich in itself, but is capable of serving as a manure to others. What fire can do to absolute clay, the sun's heat may very well effect upon common mould, which having less toughness is the easier broken.

Upon these principles is established that culture, which by means of the horse-hoe, used, while the crop is growing, proposes to raise wheat without manure: and we have judged it proper to say thus much on the nature of the subject, because it will be recommended absolutely for some of the succeeding crops; and he will be the most likely to succeed in it who best understands it. The more scarce manure is in any place, the greater will be the advantage of this method; because this is always at the farmers command in any degree that he pleases. They have carried the matter too far, who would, by the means of tillage, banish manures entirely. 'Tis certain that what is required, for the good growth of crops, is, that the earth be free and loose wherever they would extend their tender fibres. Tillage makes it thus light and loose by a mechanical operation, breaking the parts and throwing them together hollow: manures take the same effect, but by a different method, an inward

fermentation. The effect is equal at least from manure: this the warmest advocates for the new method will not deny; and it is more lasting. This is a consideration of some consequence. It is for this reason that manure prepares the field for a year or more, and tillage only for a few months; and this shews the fallacy of another reasoning of the friends of the new husbandry, who name it as an advantage of that method, that the ground can by that means be improved, while the crop is growing, and not by the other; for they should also add that after the very best preparation that can be given the ground by tillage, it will much sooner want refreshment, than after but a moderate dressing of manure. The effect of tillage is instantaneous: crops, that were decaying, revive upon it immediately; but it is soon over. The operation by manure is slower, but more lasting by far. Therefore we may affirm, that, in the soils most suited to improvement by tillage, it should never be used alone; and that in those less proper for that kind of dependance, the tillage should be considered only as an assistant to manure. In light ground a little manure will go a great way when it is joined with the effect of tillage; because the ground being in its own nature easily susceptible of the influence of these fomenting materials, and being also by the tillage prepared to receive them readily, will a long time retain the effect

effect of a little addition of these substances: and in regard to heavy, loamy, and clayey soils, the great use of tillage will be to break them in such a manner as to render them more proper for the operation of the manure: for several kinds of manures used alone wash off without effect on these soils; and tillage alone breaks them but for a small time, for they grow heavy again presently afterwards. Therefore whenever tillage would do alone, its effect in the manures will be doubled; and these will have the same advantage from repeated tillage.

C H A P. III.

Of Barley.

THE next corn in consideration and value to wheat is barley, and accordingly it requires the ground to be in very good condition for its support. The change of crops has been a great advantage to farmers in this respect, for they used to be obliged to lay the land fallow, to manure it at a considerable expence, and to give it several plowings before they could sow barley upon it, with any prospect of success: but now they find it will follow several of the other crops without any other preparation, than what they have given the land by growing upon it.

Of all crops, the turnep prepares ground best for barley. When the farmer has a clean

field of turneps, and can feed them off in proper time for the sowing barley upon the land, one plowing is sufficient, and the crop seldom fails to answer fully his expectation. If the ground be heavy, and if there have been weeds among the turneps, it will require two plowings, and these must be done with care, and a dry season chosen for them. The best way in this case, is to get the turneps eaten off in January, and immediately to give the land a shallow plowing; then in the latter end of February to give it another plowing; crossing of the first and deeper: and upon that to sow the turneps. Tho' turneps are the best of all crops after which to sow barley, there are others after, which with due management it may come very well, but it will require more expence of plowing.

It is customary to sow a slight crop after wheat, as pease, beans, or oats; but the profit of a crop of barley following the wheat would be much greater, and it may be very well obtained with due care. For this purpose sufficient plowing must be allowed; and this for a double reason; not only that the barley may be a large crop, but that the land may be left in a good condition after it: both which will be the case with due plowing, whereas a neglect of it will make the barley poor, and leave the ground fit for nothing else. The best method is this.

When

When the wheat crop is off, supposing the field to have lain in broad lands, bring in a common fallow plow, and plow it up into broad lands again. Thus let it lie till the end of December; then plow it up again in single bouts with the same plow, and thus let it rest till the middle of February; then bout it again in single bouts off the others; and in March, back bout the single bouts down. This finishes the plowing. After this harrow it all plain, give it a dressing with good mellow dung, and sow the barley, harrowing it in. This method was first practised in Hertfordshire, and has since been introduced here. The expence is something, but the farmer is to count the ballance. If he compute the produce in barley when he has allowed this management, and what he could have got by raising beans, pease, or oats in the usual way, he will find the extraordinary gain greatly overpay the charge; and will have his land in excellent heart into the bargain.

The time of sowing barley is an article of very great concern, and nothing is more difficult to be determined. The various kinds of barley, of which we shall speak presently, make a considerable difference; but in the common sort there is the whole spring for the choice, and 'tis difficult to fix upon the best season. If any one could know what kind of a summer would follow, this question would be easily answered,

answered, for a dry summer always hurts late-sown crops.

In dry soils the seed should be got early into the ground; in those which have more moisture, it will do better later. The latter end of January is the best for very dry and warm lands; the beginning of March, in general, is a better time for the others. April is not too late to sow barley after turneps with a prospect of a good crop, and even in the beginning of May, if the turneps are not eaten off sooner, a good crop may be raised chusing a right kind. in general the end of February or the beginning of March may be esteemed the best time. The farmer is not limited to a day or two, but the last week in February, and the three first in March will be generally very proper, allowing the latest sowing to the moistest lands.

The choice of the barley for seed must be very well considered. There are several kinds, of which we are about to treat; but there is one general rule which holds equally of all: it is that, whatever be the kind, it must be brought from a remote place; and from a soil different from that on which it is now to be sown. The common kind of barley sown with us is the long-eared kind; which is known by the name of common barley throughout this part of the kingdom. In the Northern counties, they sow a kind, called from the shape of the ear square barley, and by some BARE and BIGG. This is a hardy kind, and succeeds in stiff lands, where

where the other fails. In some parts of England they also cultivate the naked barley, so named, because there are no awns at the ear; and beside these we have a very valuable kind, the PATNEY BARLEY, or RATHRIPE BARLEY, which is of excellent service to those who cannot get their land ready in time for the common kind; because it may be sown very late, and yet come to a good harvest, requiring but ten or eleven weeks for its growth. To these four we may add a fifth kind called the SPRAT BARLEY, and by some the battle door barley, which in many places turns to a very good account.

Which ever of these kinds the farmer finds his land most fit to bear, he must chuse the seed corn, clean, sound, firm, and heavy. The square barley requires most time in the ground, and must be, therefore, sown earliest of all: the Patney barley needs not be got into the ground till April, and will even bear to be sown as late as May. The best season for the sowing of common barley is the middle of March: the battle-door kind may be a little earlier, and the naked barley should be about the same time with the common. Particular circumstances of his land may lead the farmer to one or other of the three less common kinds, but in general the fine long-ear'd barley is the sort he should cultivate; because it answers excellently for all purposes: and the only one, he need think of beside, is the Patney kind, when
he

he has not got his land in order time enough for the other.

THE STEEPING of the seed corn comes next into consideration; and no article deserves more regard. The effects I have seen of a proper steeping have been so great, that I am persuaded none, who have experience, will omit the due care in this article. The later the barley is sown, the more it must be steeped; and therefore the Patney barley will require most steeping of all. Barley is in less danger of being eaten by insects when swelling in the ground than wheat; and as its roots spread very shallow, it is the more easily hurt by any mischievous ingredient that may be in the composition. This directs a particular method in the steeping; and I think I have reason to declare against one ingredient which yet is very serviceable in the steeping for wheat, this is copperas. The barley does not want it, for there is less danger of insects; and I have seen several times when I used this ingredient, that the blades grew brown soon after they shot up, and the crop seldom recovered it well. On the contrary, lime in a particular manner agrees with barley, as I have found by many trials. It is upon these principles that I always use a particular method in the steeping of barley, and it is thus.

Dissolve in soft river water as much salt as will make an egg swim, and then add one third the weight more. To a tub of this throw
in

in a peck of stone lime, and stir it about till the lime is well flaked. Then put the seed corn into a large vessel of water; stir it about and skim off all the light grains; put the good corn into this liquor, and let it stand four and twenty hours; then put in allum at the rate of one ounce to every gallon of the liquor or thereabouts. This must be first dissolved in water, and stand to be cold, and it must be then put to the rest: after this the whole must stand twelve hours more, and then the liquor being drawn off by the tap, the corn must be spread upon the floor, and some flaked lime in powder sifted over it, till the grains are all well covered. In this condition it will be ready for sowing; and it is true of this as well as wheat, that if the ground be just got ready for it at the time it is ready for sowing, the crop will be the greater. The time of steeping must be varied a little, according to the early or late season: the Patney barley, which is not sown till the end of April, should have full six and thirty hours, four hours less will do for the common; or if the Patney be not sown till May, it should be allowed two or three hours longer still in the steeping tub.

The best soil for barley is a good rich loam, not too sandy: it will also grow very well upon gravelly land, where there is a good bottom of mould, and upon chalky soils, with proper dressing. Sandy ground hastens up the early-ripe barley, but it requires a great deal of manure,

nure, and the grain is never full or fine when we have done; yet the quick growth is a great advantage. If a turnep crop on a sandy soil lasts till the second week in May before it is eat off, the land may be wrought immediately for this kind of barley, and, with due steeping, it will answer very well, and be ripe in good time for harvest. The lime is an essential ingredient in the steeping for this purpose, since without that the barley would not shoot up so quick; and this is very necessary for those late-sown crops; which, if they be not covered presently by a good blade, will be burnt up at the root and not recover.

The manner of sowing barley depends in a great measure upon the nature of the land. When it is of this light kind, nothing is better than the sowing by broad cast all over the ground and plowing it in; but this will not do in hard soils. When the land is a little firmer in its nature, but still sandy, the best way will be to sow the barley after the plow, and then harrow it in: When there is such a consistence in a sandy soil, that the drill plow can work conveniently, this is a very good method; because by this means all the corn, being buried at an equal depth, will sprout together; and all be ripe together; the contrary of which often happens in late sowings of barley in the common way, and is a great damage at the harvest.

The

The use of the Patney barley we have shewn: the common kind is fit for moderate soils well tilled; and for a middle season of sowing: the others have their particular uses, which we are now to mention. When land is too heavy and too damp for these, the square barley is to be sown early, and with moderate steeping. If the farmer have a stiff damp soil, which is difficultly got into a condition for this kind of crop, let him get it into as good order as he can by the beginning of February, and then sow sprat barley upon it. The moisture in such a soil will feed a large stalk and good ear; and the firm nature of the kind will support such a large growth which would fall and lodge on any other ground. Finally, if the field, designed for barley, be clayey and stiff, yet by its situation is dry, the kind of barley should be the NAKED, and this should be sown the last week in February.

Upon the choice of the kind will depend the benefit of the crop: for these several sorts will thrive upon their proper lands; and they are not so different in value, but that a good crop of the most inferior sorts is worth more than a poor one of the best: indeed a well filled grain of one is better than a starved one of the other.

The seed being in the ground, rolling comes in as an excellent help to it. The loose soils require this most, and it always lays the mould close to the roots, and prepares the ground

ground at the same time for harvest. If the crop, when come up, looks poor, roll it again; there is no danger of hurting it, tho' it should be somewhat grown, for the ear lies yet in the ground, and all the hurt being to the blades, it will be soon recovered.

Weeds are very troublesome in barley crops; and early care must be taken to prevent them. Therefore the less dung there has been used upon these lands the better: and this is a reason why drill sowing is very useful in barley, because the weeds can be got at the easier. Three kinds of weeds are most dangerous to barley, these are *charlock*, *corn mary-gold*, and *May weed*. They are all annuals, and rise with the corn, and very often choak and starve it. Being annuals and slight rooted, they are the easier destroyed, and if once cut up they never rise again; yet their number and quantity often render this a difficult task. Dry summers most favour the charlock and corn marygold; some rain on the contrary feeds the may weed. The farmer, therefore, may direct his care accordingly: in a wet summer the two first will do him less harm; and in a dry one he may in a manner neglect the other. Charlock comes up earliest of all, and therefore may be destroyed early, when there is least fear of hurting the corn: when it threatens to be abundant, the sooner it is attacked, the better. The may weed, where it is not too thick, may be pulled up by hand; and tho' there is no expence
in

in this 'tis worth while to allow it, because if suffered to ripen its seeds, it will perpetuate itself in the land to the great hurt of other crops. Charlock rises like mustard; and the may-weed has a leaf like chamomile. They will easily be known by this, in time, and he who neglects them will loose half his crop. The charlock is to be most expected in loamy soils, and the may weed in such as are more tough and damp. On the contrary, the light loose warm grounds give birth to the corn marygold; the leaves of this are long and of a blue green, so that it is easily known. It rises late, wherefore 'tis the more difficult to be managed, but no care is too great to destroy it.

Beside the nature of the several soils, favouring or not favouring the growth of these weeds, the farmer will know when he is to expect them in great quantities, or in less, according to the former condition of the ground; and he must proportion his care accordingly. The sowing by hand I have found succeed best in clean lands; but the preference is altogether on the side of the drill plow, when the field is known to be liable to be over-run by weeds, from the seed of former crops of them. Therefore whenever these fields are of a soil that will admit the free and right use of the drill plow, let that be used: lay the whole surface very level after the last plowing, and take care of the water furrows that they are clean and free:

F

then

then sow the barley by the drill in treble rows, with intervals just enough for a weeder to walk along. The weeds, be they ever so abundant, may be then easily pulled up, without damaging the plants, and the expence will be well repaid by the good crop at harvest: there will also be the farther great advantage of the ground being clear for another season. Those, who chuse the horse-hoeing method, must leave five foot intervals for that purpose: but without leaving so large a quantity of the ground unoccupied, the Dutch hoe which a man pushes before him will come into use in the common intervals, and clear away so much of this mischievous growth, that the hand-work necessary in the rows will come much the easier. This hoe in a tolerable free soil does a vast deal in a little time, and the ground being thus well prepared for the rest, it will rid as quickly. The best season for weeding, where charlock is most destructive, is the beginning of June: where the may weed and corn marygold are most rife, it should be let alone to the end of that month. If the due care has been taken to chuse the seed, to steep it, and so suit the kind to the nature of the land, there is little reason to fear but the crop will, at the weeding season, be high and in a good condition. But if it is otherwise, let the farmer help it. 'Tis easily done at that time; and the difference between allowing a little refreshment then, and omitting it, may be, perhaps,

haps, half the crop at harvest. Some pigeons dung mixed with foot and malt dust, should be strewed over such a poor crop in a calm day, just after the weeding; and it will be best of all if there be some prospect of rain. In this case, the ground being new broke by the weeding, this light and rich manure will be washed in entirely by the next showers, and the crop will flourish to the end, for the effect of such a dressing lasts till harvest. When the Dutch hoe is used, the crop always revives after it, if nothing else be done; but the addition of such a top dressing, after this operation, I have seen turn at once a poor crop into a very good one. When barley follows turneps, which is the very best course of all, the hoeing of the former crop generally clears the ground in a great measure; and if the turneps be eat off early, and the ground can be turned up but a little to the weather before sowing, there will be still less fear.

One method of raising a barley crop upon new broke up grass ground must not be omitted, because it has been practised with very great success. If the grass ground be broke up early, and the turf buried deep, a crop of barley being sown in the common way upon the surface will succeed excellently, and while this is taking its growth, the turf will rot; so that the harvest being over, the barley stubble may be at once plowed up for wheat; and there will be a vast crop of that also: after

which the ground will be in an excellent state of tillage.

We have followed our common barley crop now to the last growth after the June weeding ; and the next care must be harvest. The common way here is to mow barley, and let it lie two days upon the ground ; then turning it, and leaving it one day more, the weeds fade, and the barley may be cocked and loaded. As barley is not apt to fall out of the ear, this may answer, but it is a slovenly and ill conducted practice. In some places they manage it as carefully as wheat ; sheering it and putting it up in stacks.

Barley may stand to be riper than wheat before it is reaped ; but still there should be moderation : for the good it gets upon the ground, when cut a little before full ripeness, is ten-fold what it would have from the root. A little rain on it, while it lies on the ground, is an advantage to the grain ; and those who cock it early, while it is wet with dew, find the corn swell from that practice, and the grain is sweeter and better for all purposes. When barley is cut at the time here directed, there must be care in the putting it together in the mow ; for if there be any damp and it be trod close, it will grow red on the inside and be bitter : this they call being mow burnt ; and it spoils the grain. The care must be to let it lie out till well hardened ; or if there be a necessity of bringing it in earlier, it must be laid
2 light.

light. There is less danger of this accident in the common way of letting the barley stand till full ripe before cutting; but the advantage of the cutting it a little sooner is so great, that it is worth the care which will be afterwards needful to prevent this accident.

We observed that, of all corn, wheat is the properest for the raising by the horse-hoeing husbandry; but as there may be particular occasions, wherein the farmer may find it useful to employ the same method for his BARLEY, it will be useful to give him, in a few words, the directions needful on that head. And first with regard to the disposition of the ground. The raising that part into a kind of beds, on which the corn is to be sown we have seen is very serviceable with regard to wheat, but it is much more so to barley, for this plain reason, that barley, being a less time in the ground, requires all possible assistance during that period; and what it may receive from the advantage of these raised beds, is not a little. Experience has also shewn another particularity in this plant, which is, that it requires a free current of air about it; and will not grow without more of this, than is absolutely necessary to wheat. Wheat will thrive very well in three rows upon each bed; but barley should never be sown in more than two; for when three have been sown together, the middle one has always risen poor. The first observation of this was owing to Mr. Navarre of Bourdeaux, and succeeding

eeding experience, has abundantly confirmed it. This gives the more opportunity for raising the beds, because always the fewer rows are sown, the higher the beds may be. This article of raising the earth for the plants brings the culture of the field nearer to that of the garden; and the nearer it is brought to that, certainly the better it will succeed.

Thus far, therefore, the farmer who chuses to raise barley according to the horse-hoeing method may proceed with certainty; that he is to raise the beds as high as he conveniently can, and to sow only two rows on each bed, leaving an interval between every two and two beds, that will just admit the hoe plow. The next article regards sowing, and for this purpose the drill must be used; but they have been extremely mistaken, who accounted it one of the great advantages of this instrument, that it scattered the seeds distant from one another; and who thought it one of the greatest inconveniences of the old husbandry, that in sowing from the hand upon uneven ground, several of the grains fell in clusters in the hollow places; for Mr. Duhamel has found in wheat, and others, yet more evidently in barley, that no plants succeed so well as those which arise four, five, or six together; provided there is a space between one such cluster and another. The two rows of barley on each bed, should be nine inches asunder, and if the farmer could contrive that the plants should rise in alternate
little

little clusters, at six inches distance, cluster from cluster, he would by that means obtain the richest of all crops. The construction of the drill box is now very well understood; and I think it would not be difficult to make such an alteration in it, as would occasion it to deliver the seed in parcels of about six grains each at those distances of six inches. I have ordered one to be thus contrived for my own use, and shall not fail to publish it if it succeeds. In this manner, every little parcel of seed in one row being dropped opposite to the vacant space in the middle between two parcels in the other row, these several clusters would have a fair distance from one another, and would rise like so many single plants with multitudes of stalks to each. There is another great advantage would arise from this, which is, that if some of the seeds fail either thro' badness, by insects, or other accidents, as some always do; still there would be no spot of the field intended for the plants left vacant. The usual method in the horse-hoeing husbandry, is to leave only single plants at these distances, and where one fails, it makes a considerable gap; but this would avoid that danger entirely. The use of the horse-hoe in the intervals would keep these clusters of plants in full nourishment; and the space between row and row will admit weeding when the crop is newly come up; after which it will not want it any more. If the

two rows of barley are planted nine inches asunder the bed ought to be a yard broad ; but it will be better to make each bed four foot broad, and to sow the two rows of barley a foot asunder, leaving four foot intervals between bed and bed. The ground of this interval will be so well dressed during the growth of the barley, that it will be in excellent condition to receive any other crop.

Barley sown in spring in this method will require to have three horse-hoeings. One of these should be when the plants have about five blades apiece above the ground ; a second just when they begin to shoot up into stalk ; and the third when the grain begins to swell in the ear. These will follow at such convenient distances one from the other, that the ground will be kept very clean from weeds all the time, and will be in excellent heart for whatever follows. The great care required will be in the horse-hoeings in summer, that the plow does not go so near as to tear up any of the plants, or to bury them with the mould it throws up ; for in either of these cases the crop will be lessened in proportion, and every accident should be avoided when the crop is to be afterwards measured, to compute the difference between that and the common produce. The farmer will understand that we give the method of doing this culture in the best manner, that he may understand it if he

he chuses the practice; but there are very few instances, wherein we would recommend it.

C H A P. III.

Of Oats.

THE demand for oats in this country has been of late so considerable, as to place that crop in a very desirable light to the farmer: And one thing has been found by all late practice, which is, that although oats will grow with little expence in manure and tillage, yet they will thrive so much the better when more is allowed to them, so that it answers very well to spend more upon them. From what I have seen, (and I have ventured more expence upon oats than most others have done) I think much more may be got by them, than by any other crop except wheat; and in many cases more than by wheat itself. This is a great consideration for the husbandman, and I shall endeavour to explain it accordingly.

Every farmer may cultivate oats, for they will grow upon any soil: but he that allows them the richest ground will get most profit. A little plowing will be sufficient for oats: they will produce vastly upon pasture ground new broken up for tillage; and they serve excellently to prepare such land for wheat, which would be

too

too rank and run into straw, if sown first upon it. A piece of ground, where wood has been stubbed up, will also produce abundance of them : and if oats be sown instead of barley upon a turnep field that has been eaten off, the dung of the sheep will be sufficient manure, and it will yield a vast crop with one plowing. I have tried some years whether barley or oats were a more profitable crop after turneps, and I find they are very much upon an equality : but as the oat will do very well in some soils which are not fit for barley, as heavy and damp clayey grounds, they should be sown upon these in all cases. That farmer will make the most of this ground, who considers barley and oats as nearly upon a level, in respect of profit ; and therefore sows one or the other after turneps, according to the nature of the ground.

Oats will succeed very well upon a wheat or barley stubble, and the ground must be thus prepared for them. In November throw it up in broad land to have the benefit of the snow and frosts : in January following, give it a very good, deep, and careful plowing. This will prepare it excellently for the seed the next month. Where a very light ground is intended for oats, it will do with one plowing. But when the loamy or heavier soils have two plowings for oats, the crop is always the better ; and the ground is left in a better condition. We have in England five kinds of oats ; of which

which the principal are two, the WHITE OAT, which is the best of all; and the BLACK OAT, which is next in estimation. The other kinds are the GREY and the RED OAT; and the NAKED OAT, so called, because there are no beards to the husks. The Scotch, the Dutch, and the Poland oat, are only slight varieties of the white oat first named. The farmer need regard none but the two first kinds, the black and the white oat; and these he is to chuse in preference to one another, according to the nature of the land. The white oat is apt to grow rank in the straw and blade; the black much less so; therefore where ground is very rank, the black oat is to be preferred; and where the soil is free from this over-richness the white. In either case the seed should be chosen carefully: the largest, heaviest, and firmest is the best; and of whatever nature the land is, which is to be sown with them, they should, if possible, be obtained from one of a quite contrary quality. The oat will grow on any, dry or moist, tough or light earth, as we have observed. But it will succeed best if brought from a light to a firm land, or from a moist to a dry; of this I have had repeated experience. The white oats yield better than the black considerably, if the soil and management be right; but an error in either of these articles will set them beneath the other.

A slight steeping of the oats for seed is always an advantage to the crop; but there should
be

be no ingredient but common salt. This should be allowed in a large proportion; and the oats, when taken out, should be well frosted with lime. Twice as much salt should be allowed to the water, as is necessary to make an egg swim; and the lime should be sifted over them while very wet, that a great deal may stick to them.

The time for sowing the white oat is the latter end of February, the black oat may be sown a week or ten days sooner. Some have ventured to sow their oats in January; and when the weather is mild afterwards, this is an advantage: but, as no one can foretell that, the farmer should not be so rash as to run that hazard. When any one chuses to sow them early, the way is to give only one plowing with a foot plow, and thus sow them under thorough, plowing them in. They will this way be the longer before they shoot, because they lie deep; and they will be the better able to stand the drought of an unfavourable summer. January is the time for such sowing; and it must never be done but upon a dry soil: for moisture would make the succeeding frosts destructive. The white oat is fittest for low ground, the black for such as lies higher. The black makes as sweet oatmeal as the white, and of as good a colour. However good a kind the oats are of, they never should be sown over and over again; but the seed exchanged from
year

year to year, otherwise the kind will be lost, for they always degenerate. If a turnep crop be not eaten off till a month after the usual time of sowing of oats, still this may be done; for they thrive quicker after this crop than any other. A very useful method in many cases, is to sow a crop of oats and beans upon the same ground, but the beans must be got in first, because they take longer time to ripen. However, one harrowing may serve both, and therefore the additional expence is trifling, the method is this: in February sow the beans by hand, broad cast, and plow them shallow in. Three weeks after harrow the ground, to prepare it to receive the oats; and sow them in the same manner, then harrow them in, and they will grow successfully together. The properest land for this is a firm but dry soil, and the black oat is fittest for the purpose. The beans will be near ripe when the oats are ready to cut, and they may be mowed together, for the beans will ripen perfectly well with lying.

In soils that are light, but have some firmness, the drill plow should be used for oats, and the crop will be no way greater; but there is no necessity for the intervals to be large enough for horse hoeing.

When the ground is in heart, the artificial grass seeds may very properly be sown with oats, and will thrive extremely being during the first growth well defended, and yet less shaded than among a crop of barley.

The

The oats, being in the ground, will require no more care till the beginning of April, when it will be a great benefit to the crop to roll the field, especially if it be of a light loose soil: this may be repeated after some time, but before the stalks rise to be so hard as to suffer by breaking. This fixes the mould to their roots, and they grow after it with fresh vigour.

Weeds are the next consideration; and against this mischief care should be taken at the time of sowing. If the ground be clean and tolerably free from them, the common method of sowing is as good as any; and the oat will do best alone. Where the farmer has reason to expect more weeds, it will be proper to sow the bean and oat crop together, which with a little help will starve them; and when there is most danger of all from a great quantity of them, it is adviseable to sow the oats by the drill, because it will then be easy to cut the weeds up, which otherwise is scarce possible.

The oat should be cut a little before it is fully ripe; for it will improve with lying on the ground. But if the white oat be the kind, this caution of cutting them somewhat before full ripeness, is yet the more essential; because it is necessary upon all accounts, that this crop must lie a little upon the ground after cutting, and the white is apt to shed in lying, if it have been ripe before it were cut. All this is to be understood with a due limitation; for if this crop be cut too green, the grain will
not

not swell, but on the contrary it will shrink. The right time is about four or five days before the state of ripeness. Oats are a nice crop to manage in many respects, but in none more than this, and the difference is very great between the value of a crop that has been judiciously managed in all respects, and one that has not. This is the reason why some are so fond of their oat crops, and others regard them so little. Very little is to be got by this species, unless something is bestowed upon it; and the farmer will seldom allow so much to it, but it will very well return the expence.

If any one should chuse to raise OATS by the new method of drill and horse-hoeing husbandry, he must plant them in double rows, with six feet intervals: the ground must be deep plowed where the rows stand, and the bed on which the rows are raised, must be carried up as high as it will well stand above the level of the rest of the ground. The distance of the two rows one from another should be fifteen inches. This will admit of easy weeding, which is a very essential article in the culture of oats, for bringing them to a large produce: the intervals here directed are also very wide, but there is no contesting fair experience. They have been tried in various dispositions, as single, double, or treble rows, but none have succeeded so well as these. The French, who are intent upon the improvement of husbandry, have carefully examined and compared the produce.

duce. Therefore the method will be to plow deep in the places intended for the beds, and then to raise them with a very fine mould. The seeds should be let in by the drill, and, if possible, they should be made to fall in those little clusters recommended for the barley: then as soon as the plants are above the ground, they should be perfectly well hoed between the rows, and no more weeds will be troublesome there. After ten days more, the horse-hoe should be brought into the broad intervals, and they should be thoroughly well broke: this will give a fresh growth to the young plants, but care must be taken not to come so near the beds as to injure them. After this the whole is to be left to nature, till the stalks are found, and have grown five or six inches above the ground; then there must be another horse-heeing, and in the same manner. As for the other grains, there will be a third required just when the oats have passed the flowering season, and are swelling in the husks. This last should be performed with a particular care, because on this will depend the great fullness of the grain, which may reasonably be expected from this laborious and expensive culture. After this the crop must be managed exactly as those raised in the common methods, and the oats will be very fine. If we may credit what has been written of these crops, it should seem that no method of culture was so profitable

profitable, because none so thoroughly branches the plants or fills the ear; but however that be, the farmer may sometimes find this sort of culture convenient; and he will find it worth his while for more than one reason. There is no doubt but the produce will be as good as the same land would have yielded in the common way, probably it will be better; but certainly the ground will be prepared in such a manner as will be very favourable to the next crop.

CHAP. IV.

Of the culture of Rye.

RYE is scarce known in some parts of England, and is not much cultivated any where; yet it is a crop that has its particular advantages. People, who are accustomed to the taste and qualities of it, will eat rye bread entire; and in general a certain quantity of it mixed with household bread is not disagreeable, and keeps it moist. But the great thing which should recommend it to the farmer, is, that it will grow upon his worst ground; and yield considerable crops, where he could expect little of any other kind. There is another use of this corn, which may often be of consequence: it is an excellent food for ewes in spring, when in the leaf: and beside the eating

it down in the plain growth on certain occasions, it may be sown with turneps to great profit; for there will be room for its small roots between; and the turnep grounds are generally in much better heart than those allowed for the rye. There is no food hogs will fatten so well upon as a pasture of rye, nor does any give their fat a better flavour; but it will require a few beans at the end of the feeding to harden, as all other foods do.

The preparation of the ground for rye is very easy. It may be sown in autumn or in spring, and this makes all the difference in the work; which for either kind is very little. Rye, though it will grow upon poor ground, requires some manure: in the countries where it is in use for bread, they make it a part of their regular course of culture; but in all other places it may also be rendered useful by a proper management. It may be sown in autumn upon wheat stubbles once plowed, and will be up in excellent time for the ewes, which have lambs in spring. The spring sowing will come in very well where better crops have miscarried; for it is a very fast shooting plant. If a wheat crop has failed in spring, or a turnep crop in autumn, rye may come in the place of either, and will answer very effectually. It is also on some occasions worth while to sow rye in order to plow it in, by way of preparing the ground for a superior kind of crop.

The

The choice of the seed must be according to the several services for which it is intended, for there are two kinds, the *large rye*, which is fittest for winter sowing; and the *small rye* for spring. The large, or winter rye, is the strongest and hardiest; 'tis the fittest for feeding ewes in the blade, and also for food of hogs in the grain. This is also the kind that should always be sown for the use of plowing into the ground. On the contrary, if the crops have miscarried, and rye is to be sown in their place, the small or spring kind is best. This will be ripe in good time for harvest; and it makes better bread than the other; being not so heavy or dark coloured. When a crop of rye is sown purposely for feeding of sheep, it is no matter what the soil is, for this corn will grow on any; but when a winter sowing of rye is designed for harvest, there must be some care in the feeding it off in spring; for there is a degree of tenderness in this grain, and though it will live in any ground, it will not bear certain accidents. Thus if the design be to feed ewes upon the blade in spring, and to have a crop at harvest, the rye must be sown upon a dry and light soil, for when the ground is heavy and tough, the feet of the sheep make holes, in which the wet lodges, and the crop then comes to little.

When a harvest crop is expected, it is an excellent custom to steep the rye. The small kind requires this more than the large, but it

does good to both: and is especially necessary when the rye is sown late; upon the miscarriage of another crop. The want of this care has prevented all the advantage in some cases; the rye never ripening in the ear for want of time for the growth. The steeping gives the effect of more time, because it pushes the growth as much in three weeks, as it would otherwise make in four.

The ingredients I have found succeed best for steeping, are only common salt and alum. The salt to be put into the water till it makes an egg swim, and than half so much more to be added; and after twelve hours steeping, the alum to be put in, an ounce to every gallon of the liquor. After the whole has stood twelve hours longer, the liquor should be drawn off, and the seed spread on a floor and covered thick with slacked lime, sifted over it, after which it is immediately to be sown. When the farmer omits this care of steeping the seed, he must not wonder if the crop run up to straw rather than fill in the ear; it is a constant fact, that the strength this liquor gives to the first shoot makes the rye sooner break into the ear; as we see in many garden flowers, the double kinds of which are shorter in the stalk than the single, though so much better furnished in the flower.

When the spring rye is sown without steeping, if wet weather follow, it always runs up into stalk, and is very light in the ear, nor will any thing prevent

prevent this, except the early care of steeping. The quantity of seed usually allowed is two bushels to an acre; but when it is steeped, a bushel and half not only is sufficient, but will yield a better crop. When sown too thick, the plants draw up one another, and grow tall in the straw for that very reason: this has been a great and common error. I have observed also that rye does not succeed so well in small enclosures, as where there is more space for the free air; and probably it is for the very same reason; the plants drawing up for want of room.

Some sow wheat and rye together, and call the grain MAISLEN. A bread is made of this in many parts of England: but it is ill husbandry: for the rye never ripens well when it is sown with that stronger grain.

Rolling is always serviceable to rye in the growth: and tho' the farmers seldom allow the expence of weeding to a crop of rye, yet it is an ill saving to refuse it. This is a grain easily hurt in its shoot, and none suffers more by weeds; especially such as will be large at the time of cutting. This is one instance, that an indifferent species will bear the expence of good management, for the encrease and goodness of the crop will overpay many times the charge; and in all other cases within any degree of moderation, the farmer that bestows most upon his ground will be the greatest gainer.

Rye is an exception to the general rule of cutting corn before it is thoroughly ripe; for this kind will be subject to many accidents, unless it ripen fully upon the ground: and it must have time to lie afterwards upon the field, for the air to sweeten it, or it will grow musty. A fair season is more necessary for the cutting this than any other grain, for rain makes the corn shoot in the ear. If the weeds be not suffered to wither very well before it is put up, they will produce the same effect, and so will any kind of wet: therefore the sooner it is disposed of, the better. And though the market of it for bread is going off, there is a new demand risen among the distillers, for it answers their purpose as well as other grain. The spirit they make from it is not coarser than that from barley; and when the legislature shall think proper to let that branch of business go on again, the farmer will find a call for this grain, which will make it well worth his regard.

CHAP. V.

Of Turneps.

THE introducing the culture of turneps into the farmers business, was one of the first steps to the modern improvements of husbandry; nor is any one greater. We are fond of newer things, because they are new; but

but the advantage of turneps are so many and so great, that no crop can reasonably be esteemed before them.

Turneps being serviceable for the changing the crop, and for the feeding of cattle, must come frequently into use in the farmer's course of tillage; and he will be obliged to sow them upon various kinds of soil; but that which suits them best of all, is a black mellow earth with some sand among it; or a rich fine loam. When it happens that there is a piece of ground of this kind for them, they will come to the greatest perfection. Turneps never will succeed well in wet heavy lands; nor will they arrive at their natural perfection in such as are light without a degree of richness to feed them. As this root may be raised either in the common way of sowing, or by the drill and horse-hoeing husbandry, the defect of a soil may be assisted by better culture. In good land, such as was just described, the turnep will grow to its full perfection in the common method of culture; but when the ground is poorer, those methods will be more advantageous, which can give nourishment to the crop while growing. Those, who are fond of the horse-hoeing husbandry, have bestowed the most extravagant praises upon it on all subjects; but its real use is on occasions, when the soil is not rich enough to feed a crop in the usual way. I have seen turneps, on the poorest and most improper grounds that could be conceived, grow

to a great quantity and excellence in this method of management. The lighter the soil is, the better this method of culture will succeed; and though the number of roots be much less than upon an equal space in the common way, the quantity will be greater, and they will be of a finer taste and quality. No turneps are so sweet as those which grow on the light soils; but as these have seldom much richness, they are small and apt to grow sticky: yet those very soils by the help of the horse-hoeing husbandry, will make them grow to eight or ten pounds weight.

Turneps will follow various crops with advantage. The sowing upon stubble land is a very good method, the seed need only be harrowed in and rolled; and unless the winter be very severe, there will be an excellent feeding for the ewes and lambs late in spring, when other food is scarcest. Beans and pease also are very properly followed by turneps, and the ground after all these is in a due condition, without requiring any more preparation than plowing up; and in many cases even that is not required. The seed of the turnep will bear trampling upon without damage; indeed it will gain advantage from the pressure which the ground gets about it by the same means. This has given rise to the practice of scattering the turnep seed upon crops before they are cut. This has been practised upon barley, and upon crops of hog pease with success. The method
is

is to strew the turnep seed over the field, a little before the time of cutting the crop: being round and smooth it is not liable to hang in the stalks of the plants, but gets to the ground, and there lies till the reapers come in, and their treading presses it into the ground; so that by that time the crop is well off, the turnep seed is ready to shoot, and the plants often escape better in the seed leaf thus, than any other way. The quantity of seed should be somewhat greater when they are sown this way, than any other, because some will fail; and the ground ought to be tender, and free from stones. Some have ventured this method upon gravelly soils, and have found themselves disappointed: for the feet of the work-people treading the seed, when softened by the moist air, upon the stones, have crushed it to pieces. Whereas when the mould is soft and mellow, this is only of the nature of the gardeners practice of treading the seeds of many kinds into the ground.

In the choice of seed, the farmer is to consider the nature of his soil: for if it be very good, the common turnep will yield him the most advantage. It will grow in fields to as much perfection as in a garden, when the ground is of this fine kind, and it has careful management. If the field be of an inferior sort of earth, he has choice of the Suffolk and the yellow turnep. The finest turnep seed of the common kind is brought from Germany. It

It might seem a jest to speak of the dutchy of Brunswick in particular, but the fact is really so: the communication between England and that part of Germany is easy, and there are no where so fine roots of this kind. A small quantity of the seed does, and it may easily be had thence; therefore this should be the conduct. As to the other kinds, the seed may be had at home, but the farmer should always get it from some other person who lives at a distance, and should take care it be the seed of a crop which has grown upon a land of as different a kind as possible from that where he is to sow it. If his ground be somewhat heavy, he should get seed from the light and sandy; and so in all other cases.

The seasons of the year for sowing must be chosen according to the use for which the turneps are intended: those for seed are to be sown in spring; but this is the smallest quantity. Those, intended for food of cattle, are to be sown either at Midsummer for a winter crop, or in autumn, for one late in spring, which last method has very great advantages. The Midsummer sowing subjects them more than any other to that dangerous enemy the fly, which feeds on the first leaves; the autumn sowing, on the other hand, is apt to introduce that distemper in the root itself, called the ambury. Those of the spring sowing often escape these accidents, merely from the rains of that season, but they come to their growth
at

at a time when they are least wanted. Therefore we should endeavour to obtain, for the Midsummer and autumn sowings, the same kind of security which nature gives to those of spring. The spring sowing requires the seeds to be well covered: those sown at Midsummer should have the ground plowed up about five weeks before to sweeten, and then twy-fallowed just before the sowing; after which the seed should be harrowed in, and if rain follows at the time of their shooting, they will be very secure. The autumn sowing we have described before, and nothing can be so easy, in which ever way they are raised: if sown by hand in the common method, about a pound and half of seed must be allowed to the acre; but in the drill way four ounces answers the purpose.

Chalky lands do not agree with turneps; and the artificial grasses on the other hand succeed so well upon them, that turneps should never be sown on such ground; nor ever on clayey soils. To all others they are nearly indifferent, thriving the better as the ground is richer, upon what principle soever. The time which we call the Midsummer sowing, may be varied according to the nature of the soil. Where that is cold and somewhat heavy, the beginning of June is the best time of all; and in lands that are extremely light and warm, the seed had better be kept out of the ground till the latter end of July. This management should

should be exactly followed ; and tho' there may be advantages or particular uses on some occasions in the others in some circumstances this is to be understood as the great season of sowing. At whatever time, and in whatsoever manner turneps are sown, rolling will be a great advantage to them ; it presses the ground about the seeds, and gives strength to the first shoots.

After this the ground is to be watched carefully, at the time of the first appearance of the crop. If the fly attacks the young plants, they are often entirely destroyed by it ; and the business there is to sow the land as quick as possible again.

When the crop has escaped this danger, the next consideration is thinning the plants and weeding the ground : these can only be done by hand in the common way ; but when turneps are sown by the drill, it is much easier and cheaper ; and this is the great advantage of that method. It is said the crop is safer from the fly when sown by the drill ; but I have not seen this in the trial. The best security I have found against that creature, is to have the ground in perfect fine order : for the stronger the turnep shoots, the less is the danger. This seed is apt on many occasions to shoot weak, and in that case the fly attacks it : for 'tis generally a diseased state in plants that occasions insects to come about them.

When

When the crop of turneps, sown by hand, is up, and has got two rough leaves, the hoers should be sent into the ground. A dry day should be chosen, and care must be taken not to bury the young crop. The weeds must be cut up, and also a great many of the turneps for being sown at random; and with this great quantity of seed, they will come up irregularly and too thick; the best looking plants are to be left, and that at a moderate distance.

No common article of husbandry work requires so nice a management as the hoeing of turneps. The most beneficial time is while they are thus young, and the first care must be not to bury them at the heart, by the mould hoed up with the weeds: nor is there less care required to know some weeds, at this early growth, from the crop. CHARLOCK is a weed most common on turnep grounds, and this has so much the appearance of the turnep itself in the first growth, that the unskilful may easily take one for the other.

Of all the manures which can be used for a piece of ground intended for turneps, dung is the worst; and the very best is lime. When the soil is somewhat clayey, nothing is so well as river sand. 'Tis best when turneps follow other crops without any particular manure; but as there may be occasions for this other management, it is proper he should be upon his guard, who is under a necessity of such practice. Dung subjects the roots to worms, and feeds them with

with too coarse a juice; lime makes them sweet, and free from those annoyances. As to the fly, those turneps, which are latest sown, escape best. Many methods have been tried to prevent the danger entirely, but more has been said of their success than is true; at least if I may judge from what I have seen in my own experience.

When the turneps are sown by the drill, without any design of horse-hoeing, they should be let into the ground in double rows, at ten inches distance, and an interval should be left between every two and two rows, broad enough for people to walk in to weed and thin them. Then the turneps, when they have two rough leaves, should be thin'd to about nine inches distance, and the best left, so as to stand alternately, and not opposite to one another.

When the design is to use the horse-hoeing husbandry, as is really the best way in very poor grounds, the seed must be drilled in single rows, at two yards distance from one another; and the turneps thinned, when they are up so as to have the best at ten inches asunder. Then the horse-hoe is frequently to be used in these large intervals; and though the number be small, the turneps will be all large and sweet, and there will be twice as much in real quantity, as could have been obtained upon the same ground by any other method.

In

In this way a crop of wheat may be very properly sown upon the same land, while the turneps are growing. This must be by drilling the seed wheat in single rows, in the middle of the intervals, about the first week in October. The turneps will by that time have had all the horse-hoeing they require; and this operation will have very finely prepared the land for the wheat.

After this, all is to be left to nature: the turneps cannot be eaten upon the ground in this case, because the corn would be damaged by the creatures that eat them; but 'tis as beneficial a way to take them up and carry them to the cattle: and these will be fit for that service in spring, and will come in very usefully to the farmer.

If the season, or other accidents, should oblige the farmer at any time to sow a crop of turneps late upon a poor ground, he must allow the more seed at first, and must leave more of the turneps at the time of thinning and weeding: for the season and the soil will not let any grow large; and therefore he should have the greater number.

The farmer, who desires to have large turneps, should save the seed of large rooted plants. This may easily be contrived between two, who live at some distance, and to both of whom a change of seed will be equally advantageous. We know in gardening, that the seeds of fine plants in their kind produce fine plants

plants again; and on this the improvement by culture chiefly depends. The fine kitchen garden plants have all been raised from common kinds by these means; and the same thing will happen from the same course of management in the field. The expectation of a large crop will induce the gardener to keep his ground in order, and the rest will depend in a great measure upon the seed.

When the season comes for eating the turneps, it is best upon all accounts to do it on the ground: for the dung, urine, and sweat of the creatures while they feed, enriches the earth. But the turneps should always be pulled up; for if they be eaten as they grow, they are never gnawed clean down; and in that case they grow again, after the land is plowed; and will spoil a good crop that shall be sown upon it afterwards: for when the turnep rises as a weed there is none worse. When the ground wants the refreshment of the dung and urine of the sheep, the best way is to enclose a piece of it into a kind of fold, with hurdle fences, and so pull up all the turneps in that compass, and lay them on the ground. When they have eat these, the fold is to be removed, and a fresh piece of the ground enclosed in the hurdles, pulling up all the turneps in that space as the other, and so on through the whole field.

When the turnep field is in good heart, and does not need this assistance, the best way will be

be to feed the sheep upon some piece of land which does; thus. Make a fold with hurdles upon the land intended to be enriched, and putting in the sheep, pull up the turneps out of their proper field, and put them into the fold: the sheep will eat them up, leaves as well as roots, and the hurdles are then to be removed to make the fold in a new place, and so on till they have covered the whole ground.

C H A P. VI.

Of the Northern turnep.

THE farmer sufficiently knows the nature of turneps, and we have here given directions for the choice and culture; but there has lately come into England the notice of a peculiar kind, which has so many advantages over the rest, that it is extremely worth his while to enquire after it. This, like the other kinds, as they are called, is no more than a seminal variety of the common turnep; but it is one of those that will remain the same from seed carefully saved, and is therefore worthy attention. Its colour is white on the lower part, and on the top green: it is more tender and juicy than any of the kinds we usually cultivate, and is also more hardy; the winter colds taking so little effect upon it, that it continues in perfection till late in the spring: and it is not liable, like the common kinds of our growth, to grow
H sticky.

sticky. The size is also a very important article, fourteen pounds is a common weight for one of them, and often they are considerably larger.

Whence the first seed of this turnep came, we do not know. It is at present cultivated in Denmark and in Sweden. The bishop of Pontoppidan, in his late history of Norway, also mentions it. He confirms what is said by the farmers who have raised it; and mentions roots of twenty seven pounds weight.

The Danes have a peculiar Name for this turnep, they call it the *Naper*, a term doubtless derived from the Latin name of the turnep *Napus*. There may be use in the knowing this, as it will teach us to enquire for the right seed.

With regard to its culture, all that has been said particularly, is, that it will bear a damper soil than our turneps: and this agrees also with what the author just named mentions concerning its place of best growth in Norway, which is on little hillocks in their boggs. This is a subject very well worth our notice, as it points out places for the culture of this turnep, which may make it of much greater value.

To speak of what is certain, we may propose it to those husbandmen upon the borders of the fens, who have ground that rises a little above the level of the flats, which are properly called by that name. In these there is always a very rich black mould, which would
doubtless

doubtless answer excellently for the nourishing this root; and the moisture of the flat ground, at the foot of these places, would give the roots the same kind of supply which they have in those hillocks, on which the bishop says they grow so well in Norway: but there is yet another purpose they may answer, which will be of more importance: this is the raising a good crop on boggy ground.

C H A P. VII.

A proposal for cultivating the Naper turnep on boggs.

THERE has been a method lately discovered in Ireland, of raising hops upon boggs; and the same course of reasoning may lead us very successfully to the culture of this particular turnep. The undertaking will be less expensive, and the care of the crop very trifling; yet there will be all the prospect in the world of great success.

In that method of cultivating hops, the bogg is to be drained; and then, holes are to be opened at distances; and mould brought from a pasture is to be thrown in to fill them: but in this, there will not require that vast labour or expence. It appears by the Norway account, that the Naper will grow no where so well as in a little hillock raised upon a wet bottom. Therefore small hills of good mould

being laid upon a bogg, drained to a moderate degree, will doubtless raise it most successfully. For this purpose a proper extent of bogg of the worst kind may be chosen, and being drained in some degree by a trench dug round it, the water may be kept by a head at such a height in that trench, as to affect the bogg only, at the depth, perhaps, of ten inches from the surface. Then let round spots be marked out for the turnep hills; and the substance of the bogg be dug away one spade deep within those circles. Let good mould be brought in from some neighbouring place, and these holes be filled up, and the earth raised into a round hill of two foot height, in the centre above the level of the natural surface of the bogg. These hillocks will, in all respects, resemble those natural risings of the ground in the Norway swamps, and the kind of turneps we are describing will grow as happily upon them. The seeds should be let in by hand in a regular manner, and the growth will very well answer for that trouble. The value of the turnep is sufficient to pay many times this expence upon ground which is of no price.

There are many advantages attending this method of raising turneps, which may not, perhaps, at once be seen. In the first place, no plant whatever, which is raised in fields, requires so much of the garden culture as the turnep; weeding and watering in particular. Now both these are difficult in fields, and the latter

latter sometimes altogether impracticable: whereas in this kind of plantation, nothing can be so easy. The trouble of weeding is all in this case, and even of that there will not be much, for it is easy to go round these hills, and destroy the weeds as they rise. In fields, the weeding of the crop is always attended with the mischief of treading down a great deal of it, whereas here the feet of the weeders would never come upon the ground, where the crop grows: they would only walk upon the ground between the hillocks, that is upon the useless surface of the bogg. By degrees also the very substance of the bogg would be improved by this, for the weeds being thrown upon it from time to time, and trampled in, would rot there; and there would be scatterings also of the mould, and of such manures as would be in a course of time needful for the improvement of the soil in the hills; and these additions, assisted by the draining, would by degrees bring the barren matter into the condition of mould.

But there is another advantage the turneps of this growth would have above all others, which is the opportunities of frequent refreshment by water, which no root requires so much for its encrease in size. The bottom of the hillocks would be moist from the very construction of the ground; and on any occasion when the surface should become dry, the water of the trench might be thrown upon them

with scoops; and would give that needful refreshment.

For this purpose, it would be proper to make the pieces of turnep ground, in this way, no broader than twice so far as a stout labourer could throw the water from a scoop. This is a considerable breadth, and even in large works there would be no great inconvenience in contriving to have the advantage by opening trenches at these distances purposely.

The great danger of a turnep crop every one knows is from the fly; this only attacks them while they are in the seed leaf; and never is so hurtful as in very dry seasons. Good watering will in a great measure secure the young crop from this devourer; and it is here easily given by a scoop from the trenches. There is the advantage not only of destroying the flies, which cannot bear wet, but of forwarding the growth of the plants, which is a second security against them; for when the rough leaves appear, the turneps are safe.

When we consider the quantity of bogg there is in Ireland, and the cheap price of labour in that country; this proposal cannot but appear in an advantageous light. The produce will be very considerable, and the price scarce any thing.

It has been just observed, that the hills will, at times, want refreshment; and this may be given them from the mud at the bottom of the trenches with a very little rotten dung. These
will

will mix freely with the surface of the hills; and when one crop is taken off, the preparation should thus be made for another.

If any objection could be raised against the proposal, it would be that the whole is to be done by labour of the hand, not by the plow and other instruments of husbandry; but this is answered already by the cheapness of labour. It is true, that this approaches more to the nature of garden culture, than of that of the field; but the produce will be so much the greater, for the garden culture is more perfect than that of the field; and the turnep is a root which indeed properly belongs to the garden.

There will be a use in this cultivation of the turnep, which the husbandman may not at first, perhaps, be aware of: it is that of feeding cows upon the roots, which, from a coarse or bad food, have got an ill taste in the milk. This turnep is peculiar in restoring it to the true flavour.

What is said of the cattle, upon the poor and barren sea-coasts of Norway, would scarce be credible, if it were offered to us upon less authority: the cows, which have little herbage for their support, feed ravenously upon the heads and refuse of the fish, which the fishermen, who cure the rest for exportation, throw upon the coast. As monstrous and unnatural as this may appear, experience confirms it: and the cows fall into no disorders from it, only their milk gets a very offensive taste. This is

cured by feeding them on these turneps. The people of Denmark, who, so far as we know, were the first that cultivated the Naper turnep, found this good, and all their neighbours follow their example. We have nothing in this part of the world so abominable for the food of cattle, as fish offals; but there are seasons when milk grows ill tasted, and it will be very proper to take this method of curing it. Whether or not there be particular virtue in this turnep, for the taste of the milk, cannot be known but by due experience: any turneps will have the effect, for they are as sweet as well as wholesome food, but, perhaps, this possesses the quality in a degree superior to others.

C H A P. VIII.

Of the culture of Clover.

THIS plant and the turnep, are the two essential articles, wherein we see the advantage of the modern husbandry over that of our ancestors. Clover is one of the artificial grasses. The plant is originally wild in our pasture grounds, where it is mowed and eaten with the common grass: but from the seeds of this wild kind, is raised that larger and more excellent kind, which we propagate in tillage ground. We call the former red honey suckle, and the latter clover, and there is no other difference. The great use of clover is for the food of cattle, and its advantage in the course

course of husbandry, is, that it comes in after one crop, and prepares the ground for another, yielding a beneficial growth, and saving that vacant time, which used to be allowed for fallowing. The Flemish farmers taught us the use of clover, and it would be well if we followed their example in the management of it: for the crops they procure exceed ours, usually by one third, and in many cases they are double. We shall here give the reasons and direct their method.

We often sow clover on poor land, but it is an error: no plant requires more strength in the ground; though it exhausts that strength much less than some other crops. The rankest soils afford the best crops of clover; and when the common practice sows oats upon an over-rich piece of ground to prepare it for wheat, by taking off the edge as the farmers call it, in many cases clover would be a tenfold benefit beyond it. This may be a very great use of clover in some cases: but in general it is to come upon land that has been long in tillage; sowing this between crop and crop; and for a longer or shorter continuance, according to the nature of the ground. The best soil of all is a rich loam that has a good quantity of pure mould among it. In other cases it will succeed better upon warm than cold land, and upon light than heavy. The finer the land is broke, the better the clover will thrive; therefore it comes well after corn, when the ground has

has been very well prepared for that crop; and as it roots deep, and the corn but shallow, it will thrive as well upon such ground, nearly as upon fresh. All the while it is growing, its trailing stalks and broad leaves shade the ground, and again mellow and prepare it for another crop; the dung of the animals, which feed upon it, completing the preparation.

The ground being chosen, and this preparation of it by other crops understood; the choice of seed is the next article, which should command the farmer's attention. If he can procure true Dutch or Flemish seed in good condition, nothing can be so proper: but newness of this seed is a thing of great consequence; therefore fresh, that is of our own growth, is better than stale from abroad.

The largest clover seed is the best; and it should be heavy and smooth, and of a pale olive colour. A little of the orange cast only shews it has been over ripe, and is no great disadvantage; but if it be blackish and dusty, it is good for nothing. We have a purplish cloverseed that is tolerably good, but the olive-coloured is always the soundest, heaviest, and best.

The time of sowing may be different, according to the practice of doing it alone or with corn. When it is sown with corn, it must be done according to the time of that crop; but when clover is sown alone, the best season is about a week after Michaelmas: for
it

it will then rise clear of weeds, and get a good footing in the ground during the winter. In most places, the practice is to sow clover in February, but I have found by many trials, that the autumn sowing yields the best crops. There seldom are winters so severe as to hurt it much; and when the winter happens to be very mild, the clover will grow to a surprizing strength by spring.

Ray grass is a very good mixture with clover, for lands that are any thing damp or heavy; for the clover will seldom there afford large crops alone. The best way of sowing these, is for them to come after wheat; and in that case the ray grass should be sown with the wheat in autumn; and the clover in the beginning of the following spring, chusing a time when there is a likelihood of rain, and rolling the whole ground as soon as the clover seed is sown. This presses it sufficiently into the earth, and does nothing but good to the corn. The clover takes its first growth under shelter of the corn, and no crop of it thrives better than one thus managed.

Our farmer's when they sowed clover with the spring corns, used to put both seeds into the ground together, but experience has now taught them better, for in this case the clover will starve the barley in its first shoot: but if the barley be sown first early in spring, and the clover seed let into the ground when that is a finger's length above the surface, both will succeed

succeed very well. The barley will be established in the ground, and the clover grow the better, because the seed will have shelter for its first shooting.

Clover may very properly also be sown with oats: and in this case it is better to sow the oats first, and the clover some little time after, as in the raising it with barley. The young shoots of either of these grains defend and shelter the first leaves of the clover, and the crop succeeds vastly the better. In both these cases the method now used in Hertfordshire is excellent: they sow the corn in the usual way, and when it is up strong in the blade, they sow the clover by means of a hand drill. Less seed does this way, and it is delivered to the ground with more regularity; for the lightness of clover seed makes it subject to be very much blown about when sown by hand, especially if the day be any thing windy.

It is an observation among the farmers, that clover succeeds better with the white oat than with the black, but the reason seems to be more in the times of sowing than in the nature of the oats, for their difference from one another is but slight. The black oat is commonly sown earlier than the white; and in general, when clover is sown in spring, it does not succeed well, if the seed be got into the ground too soon.

The use of clover is for food of cattle, and as they eat it two ways, fresh and in the hay, this

this directs the management of the crop under two articles ; the first and most general of which is, that of feeding, and, therefore, we shall first consider the clover as it serves that use. Horses, cows, and sheep, are all fond of clover, and will be nourished greatly by it ; but they must at first be brought to it by degrees, else being too rich, it will throw them into diseases.

Tho' clover will stand two or three seasons, the first year's growth is upon all accounts most valuable. The stalks are tender and full of a rich juice ; and the power of the root being entire, it shoots up quick after eating ; but in the following seasons, the root is languid and the plant is stubbley, full of hard stalks, and affording little nourishment. The first year's clover may be known by its bright green colour ; and as it loses this in the succeeding seasons, and becomes of a dark hue, it loses its rich juice at the same time.

Of whatever age the clover is, the winter and spring are the seasons when it is most valuable, not only being most wanted then, but being in best condition. In winter a small number of sheep may be fed upon a clover field, and their dung will do as much good as their feeding does it harm, but they must not be put too many into a small compass, for if they bite it too short, 'tis not so ready to recover as it would be in a better season. This is not the case with cows, for they eat too coarsely of it, treading

treading it into the ground in damp weather, and when it is young, often destroying the roots; and their dung hurts the crop as much as that of sheep improves it.

The best way of managing clover when it is intended to last some time, is by careful feeding in it; for when it is several times mowed, it soon looses the strength at the root. There is one condition only in which mowing is preferable in this respect even to feeding, which is when the clover is in danger of being over-run by natural grass, rising among it. In that case the feeding cattle upon it, especially feeding cows, promotes the growth of the natural grass, and prevents that of the clover.

The season when clover will get most harm by sheep is November; for the buds for the next year's growth are then new formed, and just risen above the ground. These afford a pleasant mouthful to sheep, and for that reason those creatures always bite close at that time of the year; but the quantity is little, and the mischief very great: for these buds being eaten off, new ones must be found before there can be a fresh growth; and that is a work of some time; whereas clover is so hardy as to grow during all the fore part of winter. So that if the November buds had been suffered to shoot for a few weeks, others would have been formed under them, and the crop might have been eat off without any damage to the plants.

Clover

Clover, that is cut for hay, should be taken for that purpose, just after the general number of the buds have begun to open into flower. If it be cut sooner than this, it is not in perfection; and if suffered to stand longer, the root will have little strength for the next growth. The quantity of the hay is greatest when cut just at the time when it is preparing for full bloom; and it is of the finest quality.

That part of clover, which is to stand for seed, should be upon a warm dry soil, and if the clover were sown in autumn, the seed will be most perfect, which is ripened the first summer: but when clover seed is sown in spring, the time of obtaining perfect seed from those plants, is the second summer. The plants for this purpose should stand till the seed is of its full bigness, and is just beginning to harden. Then it will perfect while on the ground, without losing its colour, whereas what stands to be dry in the husk before the crop is cut, will beside the waste, turn yellow, and often reddish, and what is cut while too green, will grow black in the dying. The seed of clover, which is cut just at the time here directed, will be olive-coloured, clean and glossy; and will bring a price: the farmer should obtain seed by exchange with some one at a distance, if he have it not fresh from abroad; and if he take care to have such of his own as is here directed, he may change with the best.

After

After clover of the second year has been cut for feed, it is an excellent practice to plow in the aftermath, by way of preparing the ground for wheat: and the best way of all is to turn in sheep a little before, to eat off a part, and to improve the land by their dung. It is an excellent way of preparing land for wheat in warm low grounds, to plow in a large growth of clover in the middle of May, and to sow the wheat in October, upon a third turning; on the contrary in cold lands that lie high, 'tis best to eat off the clover in spring, upon land intended for this purpose; and then to lay it up till the end of July, by which time there will be a good crop which may be plowed in, in a dry time, and the wheat sown upon it in the beginning of September. The ground in this case is not only mellowed by the clover, and enriched by the dung of the creatures that fed on it; but this crop has kept it clear from weeds, so that it has the advantage both of a good condition and cleanness.

In the feeding of clover, it is a good rule to set the crop to be eat off frequently, and while small, because the soil, when of this weak kind, will feed a supply of young shoots, but cannot support a large growth from the same roots in any tolerable freshness: if the clover be suffered to stand on such poor ground, till of a full size, the leaves grow brown and spotted. On the contrary, 'tis better in rich ground, to let the clover come to a full size, before cattle are turned

turned in, because the quantity will be much greater, and the renewed crop will come soon again to a good condition. For these reasons, clover upon poor ground should be principally eaten by sheep; and on such as is richer by large cattle: because the sheep will thrive best upon a low crop; and their dung is wanted for the ground.

We owe to the French the hint of another method of raising clover, which is by sowing it with flax and hemp. The clover does not at all injure the growth of these large plants; but all the time they are rising to perfection, it is establishing itself in the ground: the roots gathering strength, though the shoot above is but little. When the flax or hemp is pulled up, it gives a kind of dressing to the ground; the roots breaking the soil as they are pulled up; and after this the clover, having all the ground to itself, grows very fast. In such a case there may be a mowing of clover toward the end of the first year, and the quantity will not be inconsiderable; and after this the roots will strengthen themselves extremely. The use as to feeding or cutting will depend upon the choice and condition of the stalk; but if the next use be a mowing, there may be early in summer a very fine crop cut, and the roots will be established in great strength for the future growth. All this is meant to be said of the cutting clover for hay; for if these young crops should be cut for seed, the roots would

be of little value afterwards. In France, where this method was first practised, they cut one crop in November, and another the following May. We are to make allowances for the difference of weather and seasons, between one country and another; and must be guided by the general facts, not by their particular directions.

The new husbandry has got so good establishment in France (which country it indeed suits better than England) that they are for allowing all plants due distance, and a regular culture, and are great enemies to the method of promiscuous sowing. Their transplanting of lucerne has led them to the same practice in regard to clover. They take up plants from the fields sown in this way with other crops; and remove them to fresh ground well prepared, planting them by hand at a distance, which allows hoeing between. Monsieur de Pont Oriant, who first practised this method in France, planted the clover at eighteen inches distance, and allowed full use of labour to prevent weeds and strengthen the crop. The method is too new yet, to be capable of ascertainment in regard to the success; but 'tis probable, that this practice is better suited to the large grasses, saintfoin, and lucerne, than to clover. Indeed, if in England any one should wish to plant clover in this manner, there is a large white kind, which is of equal value with the red, and will answer better, because

taking root at the joints, and growing vastly branched, it will produce a great deal more from the separate plants, than the common red kind possibly could, however favoured both by art and nature.

It is certain, that when the farmer chuses to devote a piece of fresh land to clover, and considers its immediate produce more than the general course of cropping the ground, then 'tis best to sow it in autumn; and to sow it alone. The utmost preparation he can give the land will be very well repaid by the great produce, and so will any expence that he bestows upon it in labour afterwards; but the usual course of preparing for one crop in the sowing of another, which the French less regard than we, is the preferable method. We are not to wonder that they have carried the new husbandry to a greater length than ourselves; for the principal object of that practice, is to make *tillage supply the place of manure*; and where labour is cheapest, this is most practicable. We should unite both. 'Tis certain that we used to depend in a manner solely upon dung in many cases; and in all these, and in truth in all others, the right course will be to unite their influence: even clover is not an exception. We shall not recommend this plant as an object of the new method; yet it may be an instance of the great effect of the two advantages: for he who would have the largest and finest crops of this herb, should allow a

great deal of tillage first, and not be sparing of manure afterwards.

If any one chuses, from his particular situation; to raise clover alone in a piece of fresh land, let him get the ground into excellent tilth; and then sow good clover seed in September. When the frost has hardened the ground, and there is a fine young crop upon it, let him allow it a small dressing of some good manure, the kind produced of sheeps dung and earth, in the covered fold is best; but any other suited to the soil may be used. This will give a prodigious encrease in early spring: after this let him by turns feed the ground, and mow it; keeping off large cattle in wet weather; and after every mowing, let him repeat the scattering of a moderate dressing of some proper manure. In this way he will keep the roots in strength, and the ground in good heart to support them; and all the extraordinary charge he will be at, will be ten times over repaid by the produce. There is a great dispute among those who study husbandry, about the sowing a larger or smaller quantity of seed. The favourers of the new method are for a very little; because it is their principle, that a few plants, well nourished, produce more in quantity than a great many that are not: but I have not seen this hold true in clover. To be sure those, who talk of twenty pound of seed to an acre, speak of too much; but in a piece of ground so well prepared, and
so

so well supplied afterwards, as is here directed, a vast multitude of plants will be well supported: and of this I am certain from repeated observation, that the young and tender crop from a great many roots, is more agreeable, and more beneficial to cattle, than the large and rank grown stalks from a few that are fed too highly. No manure is so cheap, nor any so excellent on this and many other occasions, as that of the covered fold; which is a light mould laid under the sheep where they are folded, under cover of a roof. Twelve loads of this being given to the field after every mowing, the crop will support itself in strength for several seasons; though the plant be in its own nature only biennial, perishing when it has ripened seed. When clover is raised in the usual way with barley, it lasts two seasons very well; and enriches the land for a new crop: but when its own use alone is considered, there will be many times the advantage in thus supplying it from time to time; never letting it run to seed; and keeping it upon the ground much longer. There has of late been great benefit by feeding hogs upon it; and with due care few uses of this plant are more advantageous; but for this purpose it should be raised alone, and from time to time mowed for other uses, and new supplied with nourishment, as we have directed.

The autumn is preferable for sowing clover alone, not only because the roots get strength

during winter, but that they never fail of growing: whereas when clover is sown in spring, if very cold rains follow, it comes up but poorly; and if dry hot weather comes on, it will not come up at all. In autumn, there is nothing of this danger: it should be sown early, and therefore the best crop for it to follow, is one that is soonest off the ground: then in the beginning of winter, it should be rolled to fasten the earth to the roots of the young plants; after which, in the severity of frost, such a dressing of warm manure should be allowed as just directed; then early in spring it should be rolled again. If this care have been taken, the land in good order, and the seed fresh, there will be an excellent crop of clover upon the ground, toward the latter end of May. This should be cut as soon as it comes into flower: every part of it will then be good; and the roots, being refreshed with a slight dressing, will shoot again immediately, and this way there will be sweet clover at the farther part of summer, when this grass is naturally of less excellence.

In the making the clover into hay, there must be a great deal of care, else one of the best fodders in the world will, by ill management, become one of the worst. Clover is a more juicy plant by far than common grass, and therefore will need more time and more care in the drying. A fair season should be chosen for the cutting it, and the mowers should not be sent too early into the field.

There

There is a time when the dew is partly off, and the plant is yet fresh, though not wet. This period the mowers know very well, because it is at this season that it meets the scythe most favourably, and this is the time when the clover should be cut. When down it must be allowed frequent turning, and a great deal of time. It will shrink into a small compass this way; but the farmer must not mind that: for if it were dried more hastily, and there should seem more of it, the hay would spoil afterwards. Clover must be kept upon the ground till very dry; for if it should be stacked while there was any moisture in it, either of its own juices or of the rains that may have fallen while it was curing, there will be a heating of it in the stack, and it will come out black, ill scented, and of scarce any value. When stacked dry, it will keep a considerable time; and nothing excels it as a nourishing and hearty food.

C H A P. IX.

Of Saintfoin.

IT is not of very long standing, that our husbandry has received the advantage of clover, which is allowed to have improved the whole system extremely; and without speaking too largely, many of our strong and heavy lands have by this means produced four times the quantity of food for cattle, they could

otherwise have done : saintfoin is another plant raised for the same purposes, and is a much newer practice than the other ; we are promised greater advantages from it than from the clover, and the farmers should be reminded of that to give them spirit for the undertaking of it. Vast benefit is found from this plant in France, and in many of the Northern parts of Europe ; and if in England we can in reality receive but a third part of those advantages, it will be worth every farmer's while to know it. Those, who have tried, have never failed of good crops with any tolerable management ; and it will be easy to enlarge them by some better care. Mr. Tull must be read with caution on this head ; for this being a plant excellently suited to the horse-hoeing husbandry, he has been induced to speak of it too highly : and what Duhamel has published, tho' true in France, will not in all particulars hold good in England. If, in reality, saintfoin can be made by a just culture of one third more value than clover, certainly it becomes an article of great importance : and this I may venture to affirm it may ; perhaps something more. The plant yields an excellent, pleasant, and wholesome food, and all kinds of cattle are fond of it. The English writers on herbs, call it cocks head and saintfoin. The proper name, which they mispell in this, is not sainfoin as we now thro' custom write it, but sainfoin, wholesome hay. The quantity this plant yields, when

when established in the ground, is very great; and it is more lasting than clover. These are its advantages.

The choice of the soil is a great article in regard to saintfoin; for in this respect it is not so universal as clover. It does not thrive in heavy stiff land, nor where there is much wet. In the first of these cases it yields very little; and in the latter it soon perishes. The best ground for it is such as is light and yet rich; and such as is dry all the year at its bottom. There must also be a good depth of mould in the place, for the roots of saintfoin strike deep; and if they have not compass for this, the plant will be but ill-supplied. This may give the farmer a just sense of the nature and value of this herb; and teach him when to use it. If he has a piece of dry, warm, deep, and rich land, which he intends to lay down for one of the artificial grasses, saintfoin will yield him, perhaps, double the profit of clover; but at the least, including all points of expence and time, it will yield him such a certain advance, as three to two upon the profit of the other. On the other hand, if he attempt to raise it upon a damp, shallow, or poor soil, he will with great difficulty make any advantage of it. Thus let him judge in all cases, not running into things, because they are new; but understanding the nature and value of every species, and selecting that which is most proper for his ground. The nature of the French soil, in general,

general, favours this plant in two of the three requisites, for tho' not very rich in general, it is light, warm, and deep; therefore what is said of its produce, in the writers of that nation, must not be exactly interpreted as to our own. There is also another accidental value it has in France, which arises from the scarcity of natural grass, whose place this plant supplies; with us it has a great value, but less than there, because ours is the country of natural pasture.

Saintfoin may be cultivated either on fresh land, or after other crops; and this last is vastly the best method; for the farmer should accustom himself to count every part of his business together; and to consider every article as it may be most subservient to the rest, as well as most useful in itself; following one and introducing another. In whatever method this plant is cultivated, the ground must be in fine tilth, or it will come to nothing, On the first fixing of it well in the ground, all the rest depends, and this is never to be well obtained, but when the soil is in a perfect fine condition. When it has this advantage at the first shooting, it will be so established as to last very well eight or ten years, if the farmer chuses it; and whether it be kept so long, or the ground be broke up for corn sooner, in either case the soil always turns up fresh and mellow, and in a manner unexhausted, for a considerable depth; the nourishment of the saintfoin having been drawn much lower. Thus this excellent herb is every way beneficial,

beneficial; for as the corn prepares the land for it, it in the same manner again prepares the land for corn or other crops; and makes a highly useful link of the great chain of culture.

Saintfoin must never be sown on heavy clays, nor on deep moist mould: the next unfavourable soil to these is chalk. Upon stony ground it will do very well, tho' not so well as upon the rich deep and light kind first directed for it. But as there is commonly warmth in stony ground, this suits it; and the roots strike so deep, and make their way so plentifully among the crevices of the stones, that such crops are often produced, as surprize the owner. The grass will look fresh and be fine, and full of juice, when the surface seems a mere bed of gravel, parched by the burning sun. This indeed is a great value of the saintfoin on any land, and is owing to its deep rooting. Tillage is the principal article for the support of this species, therefore it is an excellent kind where manure is scarce; and in places remote from the house where the carriage is troublesome or expensive.

As the ground must be in a fine tilth for the seed of this plant, a very good way is to sow it with corn; but this must be barley or some other of the spring corns, because else there is danger of a severe winter destroying it entirely. When we consider the time it is to last, and the great value of the crops, perhaps it will appear best to give it to the ground alone. We shall direct

direct the method in both cases, and the farmer may make his own choice according to his particular situation.

If he chuses to sow saintfoin with barley, he must give the ground three good plowings; and if a little very old dung be allowed, it will be useful: the two seeds are not to be mixed; but the barley is to be first sown in the usual way, and harrowed in; and then the saintfoin seed must be sown by the common broad cast method. The seed must be very carefully spread, and the best way is to scatter it thin at first, and to go over the same place again with a second small cast. After this it is to be harrowed in; and the common care of the barley, by rolling and other articles, does equal good to this plant.

If saintfoin and oats be sown together, the same methods must be used; and when the crop of corn, in either case, is off the ground, the saintfoin will grow speedily. When this grass is sown with barley or oats, the earlier those crops are got into the ground the better: for the more time the grass will have to establish its young roots in the ground.

In the choice of the seed, the first article is its freshness; for the seed of the preceding season always succeeds far better than such as is older. In England we must regard all these little articles; because our climate is not so favourable to the plant as that of France. The seed should be of a fine glossy surface, clean
and

and heavy; and it should be dry and free from any musty smell. If it be damp, there is a question whether the principle of life be perfect in it; and if it be musty, there is reason to fear it has been damp; and then the same ill consequence is to be expected. The best seed is to be obtained from France; and the great care should be to get that of the last season. Some when they sow a piece of ground, that is rather too damp for saintfoin, mix some ray grass seed with it. The quantity of seed of the saintfoin, for an acre in the common way of husbandry, is about four bushells; but by the drill and horse-hoe, a much smaller proportion answers the purpose.

The time of sowing is an article of great consideration, for if the seed be got into the ground in autumn, and the plants stand the winter, there is the advantage of a season gained; but as there is a great deal of hazard in this, most prefer the spring. We have observed, that if saintfoin does not take its first growth well, there is great danger that it will not come to good; therefore we are to be very cautious in this particular. When the plant is sown in autumn, a hard winter spoils the young shoots; and if sown in summer, droughts would have as bad an effect upon it. In spring there is no danger; the moderate warmth, and natural rains of that season, happily assist in its making a good first shoot. Upon the whole, therefore, it seems to appear evident, that the
best

best method of raising this plant, is by sowing it alone and in spring.

The manner of sowing is the next consideration. In the broad cast way, a great deal of seed is required; and the plants can have little advantage during their long continuance in the ground: for tho' it is true, that we can do for them what we do for clover, by giving a refreshment of manure after each mowing, yet it will not have equal effect to that it has on clover, because of the depth at which the roots of this plant lie. Therefore it will be best, on many occasions, at least, to allow room to break the ground, during the growth of the crop, by frequent tillage. If the land have been in very good order at the time of sowing, the crop of saintfoin will take care of itself for two or three seasons: but after this, it will require that sort of refreshment, which can only be given it by new tillage of the ground about it. On this depends the farmer's choice, as to the method of sowing. If he propose only a short duration of the saintfoin, he will do right to sow it by the broad cast way, with some of the spring corns; for the promiscuous and close rise of the plants will make them, for a time, shelter one another, and there will be good crops so long as this condition lasts: but when the plants grow large, they will starve one another, and the long undressed ground will not be able to support them.

When

When the farmer has a piece of land that is perfectly proper, and chuses to let it lie a number of years in this grass, he will do best to give it all advantages, and sow it by the drill alone. This will lodge the seeds regularly, and it should be so set as to place them about half an inch deep in the ground: and it will be best to sow it in such a manner, that the horse-hoe can be brought into the intervals. For this method of culture, five quarts of seed should be allowed to every acre of ground; and the drill should sow it in rows, two and two at eight inches distance, between row and row in the pairs; and with intervals of four feet between every two and two rows.

There are two other ways of sowing saintfoin by the drill, the one intended for hand-hoeing, instead of horse-hoeing, and the other for letting the crop stand and take its own chance; as in the promiscuous method of sowing. When it is intended for hand-hoeing, the whole field should be drilled in rows, sixteen inches asunder; and when it is designed to take its chance, without any hoeing at all, the whole field should be drilled in rows of eight inches asunder.

When the plants are intended for the hand-hoeing, they should be thinned as soon as they are come up, so as to leave them about eighteen inches distant. When they are to take their chance as in the common methods, they need not be thinned at all, but the same quantity of seed

seed being allowed, they should be left to take their chance, as they come up of themselves.

When the crop is intended for hand-hoeing, the principal advantage it receives from that practice, is in the first growth: tho' afterwards there is some benefit in it after the mowings: but the best method, when the farmer chuses any, except the common, is to take the course for horse-hoeing at once. For by this practice, the plants will be kept in full vigour during the longest period of their growth: nor is the expence worth consideration; since it will be sufficient if the alternate intervals are horse-hoed once in the year. There are two reasons for which this method of horse-hoeing is proper for saintfoin. First, because the plant grows to a great size, and requires, by its long standing, this renewed refreshment: Secondly, because the great use of it is in the hay; and this may be most conveniently made upon the broad intervals, which have not been horse-hoed the same year.

Mr. Tull says there will be no need of manure all the time the saintfoin is growing; and that it will thus keep in good order thirty years, and then leave the ground in right condition for corn: but we must give the promoters of new practices allowance for a little warmth. If the farmer will keep his saintfoin ten years upon the ground, he may very well do it by this method; but if he allows some manure before each time of horse-hoeing, the
saintfoin

saintfoin will produce the more; and the land will be in the better heart afterwards for the corn. The use of this herb for cattle is equally great, whether it be eat of fresh upon the ground, or made into hay for dry fodder: but as it is often damaged by the feeding upon the spot, the great attention of the farmer should be employed upon the making it into hay. It will yield several crops in a year, all of nearly equal value: it may be cut for this purpose, either when in flower or before; and the hay will be excellent both ways: but as the root is most drawn, when the plant is in fullest bloom, the farmer who sees his crop wants strength, should, therefore, often cut it before it comes to bloom; for this will produce a new shoot stronger than the other, without weakening the roots.

The season should also, in a great measure, direct the management of the crop in this respect. In dry weather, the saintfoin should always be cut before it blows; because nature's in those seasons but difficultly able to supply the plant for a full bloom. But when there fall rains, the plant should be let just to blow. It should never stand longer than this, unless it be left for feed; because that would exhaust the roots to no purpose; and the hay would really be the worse, by the flowers dropping off the plants.

The hay of saintfoin, cut before it flowers, is an excellent food for cows and oxen: that

not

K

which

which is made from it, when in full bloom, is the best of all for horses: but care must be taken to make both sweet, and that they be thoroughly dry before put up for standing.

Beside this article of hay, the faintfoin makes an excellent food for cattle, when fresh cut and carried off the ground to them; and this deserves the more regard, because it is often prejudicial to feed the cattle on the spot.

In very rainy summers, when the hay cannot be conveniently made, the plant may stand upon the ground till the bloom is in a manner over, and it begins to set for seed. For the rains will feed it so largely, that the lowest parts will be fresh and full of juice, while the tops are setting for seed. This is not the case in drouths, because then the lower leaves soon decay, and what is gained at top, is in a manner lost at the bottom of the plant. The hay of the most full grown faintfoin must be kept for horses only: and by this means the farmer will have provision at all times, and in all kinds for his cattle; and will be able always to cut his faintfoin to advantage. If it should ever happen that the rains at any time continue till the faintfoin is absolutely out of flower and seems spoiled, the seed will make amends for this damage; for it is an excellent strengthening food for horses in the place of oats, a small quantity of it being equal to a much larger of any other kind. The nourishing quality of this food is surprizing; and it is for this reason,

son, that the full grown herb, when the seeds begin to be formed in it, is so very strengthening to the same creature.

From these observations, it is plain, that there is no state of the plant saintfoin, wherein it is not useful; nor any accident that can attend its growth, which can prevent the farmer from finding great benefit from cultivating it. More than is here advanced, has been asserted in its favour, particularly as a food for horses; but, perhaps, the love of the subject carried the authors too far. Mr. Tull says he kept a team of horses a whole year upon saintfoin hay, without any oats; and that they were in good condition, tho' he worked them hard all the while. We would not advise the farmer to venture a team upon this hazard, but certainly the general fact is true, that no food is so nourishing or so strengthening as this, and that less oats will do the more of this hay is used; which is a great consideration for those who have large teams. The hay, made of the young saintfoin, has the same excellence for horned cattle, and particularly for milch cows, for it encreases the quantity of milk.

Those, who do not chuse to keep the saintfoin a great many years upon the ground, will find that it will improve the land in a great degree, by more frequent change. Thus if the farmer chuses to limit his saintfoin to a five years crop, which it will contrive in great heart without expence, by the most ordinary me-

thod of common husbandry, he may afterwards raise three years crops of corn upon the ground, and then lay it down for saintfoin five again: this alternate course will yield all the crops rich, and at the same time the ground will be improving, throughout the whole time.

The two articles, which remain to be considered, are the methods of feeding the saintfoin ground, and of making the hay. As to feeding, the less there is of it the better in general, yet, with due caution, it may be sometimes proper. The first year, no cattle whatsoever should be suffered to feed upon the ground; and the second only sheep, and this not till late, and then in dry weather. After this the field may be improved, if sown in the promiscuous way, by the feeding, because the plants will be strengthened by the dung and urine of the cattle; but when it can have the horse-hoeing or even hand-hoeing culture, if that be well performed, it will have no need of manure, and the less it is eaten on the spot the better. At all adventures, the spring crops should be made into hay; and only the later aftermath be eaten down upon the ground, when the surface is hard, and their feet cannot make any great impression.

The making it into hay requires care; but the excellency of that hay very well deserves it: there is no way this can be done so well, as when it is raised by the drill and horse-hoeing;

ing ; because the large intervals give good room to the mowers and makers ; and the alternate ones, which have not been plowed that year, are a fine smooth hard surface, on which to spread and turn it : but tho' this be the best method, it may be made in great perfection, when sown by hand, only there will need more attendance. The mowers must be directed to cut near the ground ; for the best buds for next crop rise from the absolute head of the root, which is a far under the surface. The crop when cut must be laid in even swaths, and must lie two days : then it is to be turned. Toward the evening of the same day when it was turned, it should be made up into little cocks, in which form the juices do not evaporate too fast, but the hay dries with very little shrinking more than it had before. A little after this, the small cocks may be thrown together into larger, but they must not be beaten down ; for as these are made before the stalks are dry, they must lie light to admit still some air between them. The less sun there is while this hay is making, the better it will be ; provided there is wind : and if a little rain fall, the hay will not be the worse. Thus there is really less trouble required for this than common hay ; but there must be a nice care allowed it, particularly in getting it as soon as may be safely into the small cocks, and from them into the larger ; for it loses its virtue by being much exposed. When unfavourable weather keeps

it a considerable time upon the ground, it must be made up into larger cocks, with a long faggot set upright in the middle of each, to give a vent for the confined air, and prevent heating. When the hay is thoroughly dry, it should be made up into ricks and thatched. Thus it will keep a great while, and always come out with a fresh green colour and sweet smell; pleasant to the cattle and wholesome.

Those who save seed of saintfoin, should allot a particular part of the ground for that purpose; and allow the plants their full growth and entire time of flowering, with a few days more before they cut it: but care must be taken to observe the bottom of the flower tufts. This plant flowers in a spike or longish tuft, and the seeds of the lower part will be lost, if the stalks be suffered to stand till those at the top are thoroughly ripe. When the uppermost flowers have been a few days fallen, and the seeds in that part are come nearly to their bigness, the whole must be cut. The seeds of the lower part will thus be preserved, while the others will ripen as the crop lies upon the ground. The mowers must be sent in early in the morning, and they must work no longer than while there is some dew upon the plants; for when they are dry, the seed sheds in their falling.

When the crop is all down, it should lie to dry, if possible, without any turning; wet weather will make this necessary, and then it must be done very carefully for fear of the seed falling

falling out. After this, according to the season, it is either to be thrashed in the field or made into cocks.

When the season is very fine, and the horse-hoeing husbandry has been used, according to which the plants will lie upon a hard level surface, they may be thrashed as they lie, and the seed afterwards gathered up with very little loss: but in bad weather in this culture, and in all weathers in the common way, it must be made up into cocks, and carried to be thrashed in the barn. In these cases, the greatest care must be used to turn it lightly, and lift it gently into the carts, for otherwise a great deal of the seed will be lost.

When the surface of the ground is not clean and level, in the horse or hand-hoeing method, the saintfoin may be gathered in sheets, and thrashed upon larger sheets, moved from place to place for that purpose in the field; and a great deal of the waste will be saved this way.

When the seed is separated thus from the plants, it will be mixed with a great deal of foulness, broken stalks, chaff of the ear, and the like; these are to be separated by riddling and winnowing. The riddling must be the first article, and it will separate the long stuff, the winnowing will throw off the light and small chaff; and the seed will then be fit for use. The best service is to exchange it for good seed with some distant farmer, if fresh cannot be got from abroad, but what is not wanted for
K 4 this

this use, is an excellent food for horses and other parts of the stock.

When saintfoin is drilled for horse-hoeing, the plants should be left at about a foot and half distance in moderate land; for each plant, with the advantage of this culture, will make a head two foot in diameter, so that the extreme branches joining, the whole will be a close growth; and such a plantation may very well be cut twice in the summer, sometimes in fine seasons three times.

When a farmer, who has sown saintfoin in the common way, is desirous it should stand a longer time than usual, he must allow the ground some manure; and the best is marle. This should be spread, after the autumn cutting; and if there need any thing more, a little soot sprinkled by hand over the crop when growing will refresh it, and answer the purpose; but in these cases it is better to break up the ground, and sow corn; and to propagate saintfoin in another field. The method by manures will answer when there is occasion, thro' neglect or otherwise; but it is better the farmer should foresee what he shall want and provide in time for a new crop.

The fresh cut saintfoin in spring fattens oxen beyond most other foods, and does not subject them to disorders. The drier the ground, the better the cattle may be turned in to feed upon it, but till the roots are very well established, this should never be attempted, because they very ill bear trampling.

The

The farmer may thus feed his cows all summer with the fresh saintfoin, cut for that purpose; and given them in racks; and during all the latter part of the season he may turn them into the fields of it in dry weather. Those farms, which have little natural pasture, will find a prodigious advantage in this; and it will in all cases be beneficial where there is proper ground.

CHAP. X.

Of Lucerne.

THIS is another of the artificial grasses; and is by many preferred to the saintfoin; but we must allow something to novelty, which many naturally love. 'Tis enough that it will prove in many cases more profitable than clover; and, perhaps, upon the whole, it is full as good as the preceding. It produces more crops; but those of the saintfoin are usually larger.

The soil, in which lucerne thrives best of all, is a rich black mould, such as we have in many parts of England, on the edges and outskirts of the fen countries. In this ground, which is very like garden mould, it will produce abundantly. The next soil to this for it, is a deep and good loam: after these may be accounted the common poorer loams, for even on these it will yield large crops; and finally, chalky soils, which

which will not bear saintfoin to any advantage, will be very serviceable in this respect. There is scarce any land whereon it will not grow; but the richer the soil, the greater will be the crops in a vast proportion. The herb itself is extremely pleasant and wholesome, sweeter than clover, and not subject to throw cattle into disorders: therefore there is all the reason imaginable to cultivate it in most places. The management is easy when once rightly understood; and neither the droughth of our summers nor frosts of our severest winters will hurt it.

A plant thus hardy, thus serviceable, and thus suited to almost all soils and situations, deserves certainly our high regard: in France and Italy, they cultivate it to great advantage; and our country is at last as well suited to it as either of those; perhaps better. One particular there is relating to it, which and which only has prevented its being common in our fields long since: this is, that our culture, according to the common husbandry, does not suit with it. Lucerne will surmount all disadvantages, except the growth of natural grass among it; and that we cannot prevent in the old method of husbandry. It is owing to this, that the plant has hitherto failed in England; but the new practice with the horse-hoe will secure the ground from that accident; and we may with that advantage sow it without the least hazard of miscarriage. What we are most to avoid, is a tough or moist bottom under the bed of soil.

soil. A heavy clay is very improper, tho' the soil should be two foot thick above it; for lucerne roots very deep; and where there is wat at a small depth, it will be equally disadvantageous. Setting aside these two things, there are few places where it will not thrive; a warm gravel will support it with the assistance of a little manure, and even our sandy soils, if not too barren, will yield it in large crops.

When the farmer has fixed upon a piece of ground, let him see that it be well cleared of the roots of perennial weeds, and particularly of couch grass, which is the great enemy of this plant. The crop of lucerne will last many years, and, therefore, some pains may be very well allowed to prepare for it. There is a necessity that the land be in very fine tilth. Therefore it will come best after corn. It succeeds also extremely well after turneps, or after any of the pulse kinds.

The seed must be obtained from France, where at this time they cultivate the plant to advantage, and a great deal depends upon having it fresh: this may be known in some measure by the aspect, flavour, and weight of the seed. It should be clean and sound, bright on the surface and heavy. If there be dust among it, 'tis usually old or in part decayed, and when light it is of little value.

There is but one season for the sowing of lucerne, and this is late in spring. The latter end of April is the best time of the whole year. Some

Some have sown it in autumn; but unless a very mild winter follows, it will come to nothing; and 'tis not worth while to run this hazard. After the plant is once established in the ground, there will be no danger from our winters; but it is tender in the first shoot. Some have sown it with spring corn in the manner of clover, but experience shews this way is improper; the corn takes that nourishment from the earth, which the lucerne wants for its first shoot; and this being raised weak, the plant comes to no good afterwards. Therefore he, who would raise lucerne to profit, must allow it the ground to itself, and put it in good condition; no more is required for securing large crops, but without this there is little expectation of them.

As the lucerne must be raised according to the new method of husbandry, the sowing must be done by the drill plough, and the spaces considered for the horse-hoe afterwards. The ground being in good order, must be laid level by harrowing, and then the lucerne seed let in by the drill in single rows; at six feet distance from one another. When the plants come up, they must be thinn'd and very carefully weeded, the strongest and most promising must be left at ten inches asunder. After this the broad intervals must be plowed up with the horse-hoe at times, as weeds rise in them, and the spaces between plant and plant in the rows kept clear by hand hoeing. The husbandman

must

must not wonder at the distance of the rows of lucerne, nor at our directing them to be single. Experience is the best guide, and all the trials which have been made prove that the ground, planted in this manner, will yield greater crops than by any other. The lucerne will grow very quick, when it has thus a free scope of ground, and every plant will encrease abundantly by dividing into many shoots at the head: so that the absolute quantity will be very great from a few roots, and the repeated crops in one year from the same ground will raise the whole to a very great consideration. As the English farmers are unexperienced in this article, it will be proper to acquaint them that they are not to judge of the future crops, by those of the first or second year; the third season will be greatly better than these, but even that much inferior to what will be the constant and certain product afterwards. Therefore let them wait its first growth with patience, and allow the little labour it requires in tillage freely: the reward is certain, and it will be greater than he can conceive who has not seen it.

If the seed has been sown in April, the plants will be half a yard high by the middle of August, and they will begin to flower. They should be immediately cut at that time; for the suffering them to blow would exhaust the root; and this method of taking off a slight crop just at that time strengthens them extremely.

treely. This should be done with the scythe; but the mowers must have a caution not to cut too low; for the stumps will shoot out quicker than the heads of the roots, and the roots will be better supported.

Toward the latter end of September, the plants will be grown of a height to cut again, not for the value of the crop; but for the good it will do the roots. After this cutting the horse-hoe should be carried along each of the intervals; and if the ground wants a recruit of manure, this is the time to give it. By this management the virtue of it will be washed into the ground by the autumn rains; and the plants, being not encumbered with a useless head, will strengthen at the root and make a great push the succeeding spring. To favour this it will be proper to bring in the horse-hoe again toward the middle of February, but only every other interval should be turned up; and the same practice should be observed in all the following horse-hoings, by which means there will be always clear and hard spaces for making the hay. If the farmer should chuse to drill it in rows at a small distance for hand-hoeing, he must in general observe the same practice; but upon the whole there is no comparison between the two methods. The labour of hand-hoeing, which should be repeated after every crop, is much greater than the horse-hoeing; and the produce is less.

The

The greatest advantage of this plant will be in keeping it for hay: cattle are fond of eating it upon the ground, but they damage the heads of the roots; and as their dung is not wanted according to this management, it will be better to keep it for the scythe.

Several crops may be expected from a well established lucerne ground every summer: and the plant may be cut at different growths with equal advantage, according to the various circumstances of the ground. A very fine hay is made of it, before it comes into flower, also when it is in bloom; and another kind scarce less valuable when it has run to seed. Therefore the farmer must consult the season and his own convenience on this head. We shall be particular in directing the management of the crops in making them into hay; but there is yet another article relating to the culture of the plant, which must be first discussed. This is the invention of the French to improve the crop by transplanting. The thought is owing to Mr. Chateau-vieux of Geneva, who observing that long rooted plants often thrive better for transplanting and cutting off a part of the root, tried it on lucerne, whose root is remarkably long and single; and found it answer in experience.

When lucerne takes its natural growth in the place where it was sown, the root runs down to a vast depth, and there are few fibres shot from it sideways, and those inconsiderable. On the contrary, when the plant is taken up, and the

the long root cut off at a foot from the surface, it sends out many large side fibres, which draw a great deal of nourishment, and consequently the plant will yield a larger produce. The experiment has been fairly tried, by computing the produce of lucerne, sowed in rows with certain intervals, and lucerne transplanted into the like rows; and the transplanted roots have been found to yield most by a very considerable advantage. These experiments having been made various ways, and thro' the whole with a great degree of care, have served at the same time to ascertain the disposition of the plant to most advantage: for it has appeared, that when lucerne was planted in single, double, and treble rows, the single row crops constantly produced the greatest quantity.

Lucerne will bear transplanting at any age; but the best time is at about six months growth; and the most favourable season is autumn. Therefore when lucerne has been sown in April, it should be planted out toward the end of September. Rains usually fall at this time of the year, and they take off the trouble of watering the plants: but if the weather should be unnaturally dry, there must be a watering cart used to moisten the earth once well about them. The plants will take root very well, if transplanted in spring; but then we lose the advantage of that year's crop.

When plants sown in April, are transplanted in September, the roots should be cut off at

about

about seven inches below the crown; and at the same time the stalks should be also cut off to about two inches long. The roots must be taken up with great care; and the person should have a pail of water, into which they should be thrown as soon as taken up, and carried in the water to the ground, where they are to stand. There the ground must be in perfect condition to receive them, and being trimmed and immediately planted, the mould must be fixed well about them. All this is very easy: it will require little more time and trouble than are necessary for the thinning a crop, which stands in the usual way when it is raised. When the roots of older plants are used, they may be left a foot long, but there is no difference in the management.

The same care must be taken to weed these rows as in the common way of sowing; and the horse-hoe must at times be brought in to turn up the intervals. The oftener this is done the better. If it be repeated every six weeks to the alternate intervals, from February to September, the crop will be found very well to answer it.

This method of raising lucerne, in the way of transplantation, may be extended to all the perennial artificial grasses: we have already named it under the article clover, but it succeeds yet better with saintfoin, because that is a larger plant. The consequence of cutting off the main root in transplanting, is, that instead

L

of

of one, there will in a little time be three, four, or more such roots to every plant; and they will shoot fibres also of a thickness equal to young roots. The main roots, even where there are three or four of them, will be thicker than the single ones of the natural lucerne; and the head, produced by the plants, will be increased also in a proportionable manner. The first stalk that is cut off in mowing, the virgin root shoots out heads on each side, and forms a kind of crown a little below the place where it was cut off, and this crown increases yearly, till it be two foot over toward the intervals, and till it touches the next plants each way in the rows. From this crown rise the shoots which make the several crops, and therefore the larger is this crown, the greater will be the produce. It has been found, that when the lucerne is thus managed, every plant will yield a vast quantity of hay, within the year. The computation is, therefore, easily extended to an acre of ground, as the plants stand at a regular distance; and when we take in the value of the hay, which is at least equal to that of saint-foin, and greatly preferable to any other kind whatever, we shall be astonished at the advantage to be made of this plant, and at the neglect wherewith it has been treated so long. This computation is made from the produce of the plants, when they have only the advantage of tillage without manure; it will be much greater when the farmer shall use some manure

at times also during the growth: and this is a thing so easy when plants are raised in rows with large intervals, that it never should be omitted. The hay, thus produced by lucerne, is too rich for the common food of horses, which have corn and hay alternately; and only should be given in change. If any thing like what is said of it, in respect to the keeping horses in good order without oats, be true, it will be an article of prodigious advantage. With the management here directed, and the help of a little manure, the farmer may have constantly four crops of lucerne hay in the year, beginning in May, and cutting the succeeding growth at about five weeks distance, or between five and six weeks, so that the last crop may come within the best weather of October. In France they have sometimes six crops in a year. When the lucerne is fit for cutting, very careful mowers must be chosen, and they must be directed to cut it a little above the crown. The scythe must be in order, and the plants must be moist with the remainder of the dew, otherwise the work will be irregularly performed, and a great many of the weak stalks left. The very best hay of lucerne is that which is made by cutting it before it flowers; there is also another reason for cutting it early, which is, that another crop comes the sooner.

A fair season is a great advantage in making the hay, for lucerne takes a considerable time in drying, and is apt to get damage by rain. When it is

thoroughly well dried and housed, it will keep good three years: but it requires housing for this purpose, for it does not bear the open air so well as the common kinds of hay: in a good season, the hay may be very well made in about ten days. Cattle are very fond of it also when fresh cut; and this way it may be extremely serviceable.

When the farmer has an established piece of lucerne, all he is to fear is the natural grass getting in among it: for that rooting shallow, and the lucerne deep, it will be easily nourished, however well the crop is established on the ground; and lucerne is a plant that will not grow among common grass. When this accident of grass rising in the ground is perceived, the plow must be worked boldly to destroy it. A furrow must be plowed from each side of every row, and then the whole piece must be well harrowed cross-ways: this will not only drag away what grass the plow has tore up, but will tear away also such as grows between plant and plant in the rows. The heads of the lucerne will be a little hurt by this, but there is no other way; and if the grass be fairly cleared off, they will soon recover. After the harrowing, the two furrows, turned from each row, should be again thrown toward them, and this will give them a new strength, being fresh earth laid directly to their roots. Neglect generally is the occasion of a field of this plant being over-run with the natural

natural grass: and if it be too far gone for the last mentioned method to recover it, the natural grass having grown to an absolute turff, in that case, the four coulter'd plough, is the remedy directed by Mr. Tull, who advises the going round every row with it, turning the furrow toward one row, and from the next the first time; and the next turning them toward those from which they were thrown before; but however well this method may be calculated to destroy the grass, it is tedious and expensive. The best course is certainly to break up the ground and raise another crop upon it; reserving the best roots of the lucerne for transplanting into another piece of ground: there is no doubt of their flourishing in the new ground, however decayed they appeared in the old: nor is there any age at which they will refuse to take root. Mr. Duhamel has given us an instance of the success of transplanting old lucerne from his own experience. His workmen thought the roots would decay, but not one of the whole plantation failed.

Although what we read of lucerne is principally from foreigners, I have the satisfaction of being able to assure the English husbandman, that this plant is found to answer as well with us in practice, as in any part of the world. Even the new method of transplanting it has been used here with as good effect, as at Geneva, or in France. In Cornwall, an ingenious clergyman who has distinguished himself lately

by his writings, has transplanted lucerne from the April seed-bed in September, and had so good success from it as to cut four crops in one year; and the plantation is now in excellent condition.

CHAP. XI.

Of Natural Grass.

HAVING spoken of the principal kinds of artificial grasses, raised by culture, it is our next concern to direct the farmer in the best management of that excellent product, which nature offers in every spot where she is undisturbed in this fertile kingdom; and which is the produce of our pasture and meadow grounds. Grass is universal in England, where culture has not disturbed it; but it is of various kinds, owing to the several species of that little plant, some of which love hilly and others flat ground, some requiring but little, and others a great deal of moisture. Beside this difference of kind in the grass itself, there are other plants which delight to grow among it, and make what we call a bottom, adding to the quantity as well as quality of the common grass. The small trefoils are the most usual plants for this service; but there are others more valuable, tho' less known as yet among us: the two principal of these are kidney vetch, and lady's mantle. Cattle thrive greatly
wherever

wherever these grow, and the farmer may make them grow wherever he pleases; for they are native plants of England, and will rise wherever the seeds are scattered. Beside these advantages, there are other natural differences in the produce of grass, and its value, which a good management may always turn to account. Too much shade will make grass sour; and too wide an exposure will give it to the power of the winds in such a manner, that an unfavourable spring shall cut off the prospect of any tolerable crop. The medium is, therefore, always to be sought, and may often be obtained by enlarging or retrenching the enclosures.

Thus we may say in general terms, that by a proper disposition of his hedges and plantation of timber trees in them in the upland pastures; and by banks and drains to overflow and discharge the water from those low meadow grounds, which lie upon the banks of rivers, the prudent husbandman may encrease, perhaps, one third the quantity of produce from his natural grass grounds: and if we take in the article of sowing the trefoils and the like to give good bottoms, he may yet add farther to the quantity, at the same time that he encreases the goodness of the crop. The assistance of manure is also very considerable; but this depends greatly upon a choice of a right kind. Where neglect or ignorance leaves the grass ground to itself, frequently there

grows up a bottom of moss instead of clover, which by degrees over-runs the ground: but a due choice of manure, and an attention to which of the bottoms will agree best with that particular soil, will displace it; and give one of these in its place.

From this general view of the subject, we are led naturally to all the particulars. Let the farmer look over his pasture ground first with an eye to the disposition; and remedy what is amiss in that. In upland pastures no close should be more than ten or twelve acres, and in low meadow grounds, not more than fourteen or fifteen, with the hedges: for ditch divisions do not answer that purpose of enclosure, which is expected from shelter. Therefore if there be any where a close of more than this quantity, let a hedge be run across to divide it into two; and in the same manner, if there be any two very small closes, let the hedge which parts them be stubbed up. As too large closes expose the grass to the blasts of spring, those which are very small, give it too large a shade: in the first, the farmer is often disappointed of his crop, and in the other the grass is sour.

The larger the closes are, the more timber-trees must be planted in the hedges; and the greatest quantity of these should be to the North and North East: for the more large trees the more shelter. For the same reasons small closes should have little more than hedge shrubs,

shrubs, because too much shelter spoils the grass. No close should be less than five acres, about seven or eight is in general, perhaps, the most desirable bigness.

The next consideration is to have the entire use of the ground, and every part of it, for the service for which it is intended: for every inch, that is lost or useless, is so much of the crop deducted. The hedges should be no where suffered to intrench upon the ground. From their nature and the growth of the shrubs, they are often too much disposed to it; and it is scarce to be thought how much ground is often lost by this means. Brambles, which are common in almost all hedges, drop the ends of their branches to the ground, and there take root again. The place where the end of a bramble touches, the ground is often a yard from the hedge where it rises; and a bush is thus begun at that distance within the close; which spreads from time to time till it has run in a yard more. Thus there grows out a kind of wen from the hedge six foot into the grass; and at a small distance from this, perhaps, there is such another formed by the running roots of some black thorns or sloe bushes in the hedge; and thus at small distances round the close.

The grass which grows round about these is poor, and that between one and another of them is scarce regarded by the mowers, or indeed scarce is worth regard. Now if the farmer would count up the quantity of
ground

ground he loses by taking away five, six, or seven foot of it all round, he would be startled at the sight. Let him be aware of it in time, for the loss is not the less for being less perceived.

Therefore, whoever has pasture ground, should thus go round the hedges, and have all these excrescences from them stubbed up, laying the surface level, and sowing hay seed upon it.

Let him next cut down all the unnatural risings in the ground itself, ant-hills, mole-hills, and the like, levelling the earth, and sowing hay seed as in the former instance. This being done, the perennial weeds are to be taken up carefully by the roots, and then the ground being free and clear, the advantage of a damp day should be taken to roll it with a heavy wooden roller. The best season for clearing the ground is autumn, that the grass seeds, sown upon the bald spaces, may grow up in time to come to good in spring; and at that season the ground should be cleared of such large weeds as escaped the autumn search, and then rolled again.

This is the universal management of grass ground, from which we shall be led naturally to the farther particulars.

When a pasture is impoverished by cutting frequent crops, it may be improved by feeding for one whole year, if the case be not too bad; and in the worst instances by dung or other appropriated manures. The finest
grass

grass is that produced upon ground which lies with a gentle descent, for the tops of hills are often boggy; and when wet lodges, it spoils this product. The only grounds which lie in this situation, and are unfit for grass, are those which have a stiff clayey soil, for this does not naturally produce a fine grass; nor can it be improved much by manures, while covered with a turf; it is therefore of advantage to this to be converted into tillage. Of all soils, a good loam produces the best grass. If such a kind of land lies upon a gentle descent, and with a somewhat damp bottom, where any person is curious in his natural pasture, this is the kind of spot on which he should fix. The benefit of flooding of grass ground is so great, that all possible methods should be used to bring it in practice: when it can be done by letting in the water of rivers thick with mud after heavy rains, this is best of all; and this is not limited to those grounds only, which are nearly upon a level with the water of the river, or beneath it; for where there is some feet above the height of the water, yet if the ground lies tolerably flat, there is an easy way of bringing the water over it with an engine: 'tis an advantage where nature will do this; but it will in other cases very well repay the expence of such management. The water of springs, which rise on higher grounds, may sometimes be brought over pastures; and even this will be a great benefit, though not equal to the other.

other. Because these waters are hard, cold, and clear, whereas the others are soft, warm, and full of rich matter for manure.

When there are a few anthills, and those not very large, that is when the complaint is new, they may be cut up with the spade. There is a sharp thin spade made for this purpose, and the method is to cut down the hill cross and cross, so as to divide it into four parts, then the corps is to be scooped out, and the four pieces of turff thrown into their places again, where they will soon join together by new roots, and grow. But as this practice often deceives the farmer, by the ants which are left, breeding and encreasing again, the best way is to have a parcel of fresh and strong lime broke small, and when the body is cleared out, to sprinkle some of this over the raw back of the turff, and in every part of the hole. This will destroy, or at least drive away the remainder of those insects, and the ground will be clear for the future.

When the disorder is of longer standing, and the hills are large and numerous, they should be cut up by the anthill plow, an implement made for that purpose. This is drawn by a couple of horses, and cuts thro' the hills at their bottom, leaving the surface of the ground level. The bare places thus made should be raked with a garden rake, and sown thick with hay seed, and the hills being all carried off the ground, must be set up in loose heaps

to dry, and then burnt to ashes. These are an excellent manure, and the quantity of them very well pay the expence, beside all the good that is done to the land: if a larger parcel of manure be desired to be made from them, they may be piled up in a heap, and sprinkled over with lime between the several parcels; then some dung may be laid over them, and thus they will rot together, and make an excellent manure for pasture ground.

If a pasture ground be in danger of being over-run with moss, and the mischief is seen in time, the proper remedy is to use a large quantity of coal ashes mixed with rotten dung as a manure: this will at the same time destroy the moss, and promote the growth of the grass. But often this mischief is not seen till too late for such a remedy; in which case the custom of our husbandmen is to pare off a part of the surface, and burn it in October, then plowing in the ashes to sow the ground thick with hay seed. This method has been also used some out of mind for recovering worn-out grass lands, and bringing them again to yield large crops: but we owe to Mr. Chateau-vieux a much easier and more expeditious way. He has contrived a three coultered plow, which may be made to cut at different depths by the setting the coulters accordingly: and with this the whole surface of the pasture is to be cut to pieces without turning any of it up. The coulters are to be so disposed, that they shall cut

cut the whole into slips of about three inches broad, which are to lie in their places; and a good quantity of manure is to be then thrown on. This will be best done in autumn, and the rains, which usually follow at that season, will wash the whole richness of the manure into the very substance of the ground. The moss, which usually over-runs these worn out pastures, will be, in a great measure, torn up by this plow, and left to wither; and the roots of the turff, which are thus cut thro' and thro' at small distances, will shoot new fibres innumerable, which will presently unite them one to another, so as to form a sward as firm as before, and the new nourishment will send up grass with a peculiar freshness and in vast abundance. The inventor of this method speaks of it with that extravagance that people usually do of their own improvements: he says one load of dung will this way go as far as three, and that one acre of pasture ground, so managed, will produce as much as ten acres in the common method. Allowances are to be made on all these occasions, but if the farmer uses the common quantity of manure with this cutting, and it takes but twice the effect that it otherwise would, the thing is certainly worth his most serious attention. The practice will succeed best in those grounds that have moist bottoms; in all others a great deal will depend upon the following weather; for

for which reason the farmer's great care must be to do it before rain.

When the pasture ground is in this general manner prepared for its full service, the farmer is to consider this best way of managing it for the two uses of its produce, hay and feeding. The very best pasture food now in use, is a mixture of common grass and Dutch clover: that is the common white trefoil. This may be added to the natural grass of a meadow or pasture, by sowing upon the sward in autumn; but the very best method of raising an excellent pasturage, when there is opportunity, is from a piece of ground that has been in tillage. In this case the land should be made fine, and harrowed level in September, at which time the hay seed should be sown. There are many kinds of grass suited to various soils; and they must be regarded in the chusing the hay seed, because those, peculiar to one soil, will not grow upon another. Therefore the farmer, who intends laying down a piece of tillage land to natural grass in autumn, should, in the course of the summer growth for hay, mark some ground which has a good kind of grass, and a soil and situation like his own. The hay seed must be saved from the hay of this pasture, and it will grow vastly the better for being thus fresh. When the ground and seed are ready, the middle of September is the best time for sowing; and it should be done in a calm mild day, when there is a prospect of rain.

rain. The seed must be sown thick, and should be harrowed in with a bush harrow. This implement is made of a parcel of black thorn bushes, tied and watted into an old gate; and being drawn over the ground by a horse without shoes, is preferable to all other things for this service. The quantity of hay seed should be five bushels to the acre: less is commonly used, but 'tis wrong, for the thicker the grass comes up, the better it will grow. Some use a common harrow with short teeth to cover the seed; but it buries it too deep. A week after the grass seed is sown, it will be proper to sow the plant intended for a bottom to the ground: and the best in use is the white or small red clover; the white is called Dutch clover by our seeds-men, and the small red is now called iron clover. If the ground be dry, the iron clover is best; if it be more damp, the white: but either make an excellent bottom.

This is the time also for the farmer, who would make improvements to sow the kidney vetch, the yellow medick, or the like plants: the seeds of these should be mixed with that of clover. About six pounds weight of the red or seven of the white clover, is sufficient for an acre; and one pound of either of those other seeds. These, whether the clover alone or clover and some other, are to be sown evenly by hand all over the ground in a calm day, and immediately after the ground is to be rolled all over with a heavy wooden roller.

roller. This will sufficiently press in the clover seed, and it requires no other covering: it will favour the growth of the hay seed also by laying the mould close about it. The crop will soon rise with the autumn rains, and at the latter end of October, the ground must be carefully rolled again. Then nature will do her business during the winter; and in spring, about the end of February, the ground must be once more rolled. No more care is required: there will be a vast crop of hay the first summer, and so good a bottom, that it will bear feeding excellently afterwards. This is of all methods the very best for obtaining a capital piece of pasture ground: for here all the common inconveniences will be avoided. It will rise in excellent condition, and be easily kept in order afterwards: the ground will be perfectly level for the mowers, who may for that reason cut the hay two inches closer, than they can in common pastures; and this will, beside adding to the quantity, make the next shoot more plentiful, for the new crop in common grass rises from the root, not from the stumps of the hay. There will be no weeds to starve and bury the grass; nor anthills to spoil the pasture: whatever inconvenience of this kind offers, will be seen at once in so clear a ground and easily removed; and the spot, after it has bore grass as long as the owner pleases, will be in a fine condition to turn up for corn again. Since the introduction of the foreign

M

artificial

artificial grasses, there is the less need of our laying down corn lands for natural pasture: but there are occasions on which it will be still proper; and with these cautions it will answer excellently. When we give that vast preference, which is usually allowed to the artificial grasses over the natural, we reason in some degree unfairly: we should give the natural grass the same advantages they have; and then make the computation. The farmer may be assured, that a piece of grass ground thus prepared, and managed as we shall direct afterwards, will produce for a long course of years one fourth, or perhaps one third more than another of equal extent, ill laid down and carelessly conducted; and will answer nearly twice the purpose for feeding.

This way of making a natural pasture is not limited to the laying down a piece of tillage land; it will answer equally well in the breaking up of an old worn-out piece of natural grass: but for this purpose, the method by the three caulked plow, and a cross plowing upon it is preferable to all others. 'Tis odd that we in England, who have the finest grass in the world, should owe the methods of managing it in the best manner to foreigners; but it is certain that Mr. Cheateau-vieux has laid down a method that vastly excels all those in use with us; and 'tis well worth our while to imitate it frequently. When a pasture is worn out for the grass, and over-run with weeds,
poor

poor for want of manure, and covered with moss, so that it produces little, and answers scarce any purpose for feeding, it should be broke up for a new crop of grass in this manner. Let the coulter of the three coultured plow, be set so as to cut five inches deep; and drawing it all over the ground, cut the surface into slips of three inches broad; then plow the whole surface a-cross these cuts with a common plow; let the return of the plow be at about half a foot, and thus go all over the ground. The old grass will wither, and the slips of turff moulder away. The ground may then be harrowed and laid even, and the seeds of hay and clover sown upon it, as directed in the former instance. The crops of hay and the aftermaths will be of the same large and excellent kind with those from the former instance, and the dressing of this sort will prepare the land for good service again for many years. The inventor of this method proposes it for the raising corn upon an old pasture, for which service it is equally proper: for the land, thus prepared, will support any crop.

By which ever of these methods a piece of new pasturage is raised, it is to be considered, after the first season, exactly as any other pasture ground; and the following management will keep natural grass land of any kind in excellent order.

Early every spring, let the ground be cleared of any accidental rubbish that may have fallen upon it ; branches from the trees in the hedge rows, and stones and bones which may have come on with the manure. The persons, employed to pick off these, should be directed also to pull up weeds. After the clearing of the ground once thoroughly, as we have directed, there will be few of these in a common pasture ; and in such as has been raised as here advised, there will be scarce any. When this is done, the ground should be rolled with a heavy roller, and the fences looked over, that there be no gap in them. Thus the ground is prepared for mowing. The sooner the crop of hay is got off the better ; so that it should be cut as soon as ripe ; the marks of which we shall lay down presently. After the cutting, let the farmer look about and see if there be any bare or thin spots ; and raking up the surface a little, he is to sow these with fresh hay seed.

When the grass has had some time to shoot after the mowing, the cattle should be turned in to feed ; for the method of cutting a second crop of hay is very injudicious : it is always poor, for 'tis only the blade ; whereas the value and richness of hay depend upon the seed buds in the ear. The weather usually spoils this second crop in the making, and it always exhausts the ground, and defrauds it of the natural dressing

dressing it would receive from the cattle, that otherwise would feed upon it.

Toward October roll it well over again, and repeat the rolling and clearing of the ground every spring and autumn: with this care, it will require a dressing of manure only once in four years; and it will thus be kept in heart for a vast length of time. The higher the ground lies, the smaller crops of hay it will commonly yield; but these will be excellent in their kind. The low grounds are therefore, in general, fittest for the production of grass, because of the large quantity they yield, and the small assistance of manure they want: but such as we have directed, with a small descent upon the whole, exceed all others. The winter feeding on these grounds is also a great advantage, for they yield a handsome supply of grass excellent in its kind, when the low grounds will not bear the feet of cattle: and at these times when the hay is off, and the aftermath affords the pasturage, they may be considered in a great degree as artificial grasses, for the clover being pressed down year after year by the roller, and taking root at every joint, will be the great producer of food at these seasons.

In low grounds, which have the advantage of being overflowed, the greatest care should be taken to keep off the water at all times, but when it is wanted. If the carelessness of the farmer lets the wet lie upon them all winter, as is often the case, they produce the water grasses,

which no cattle care to eat. They should be kept dry at all times, except when, during winter, there are heavy floods which bring down a kind of manure; and once in spring, when the overflowing will set the grass to shooting for the hay season. Where the waters can be let on, and taken off again at pleasure, every time in winter, that the water of the river is very thick and muddy, it should be let in; and when this mud, which is the finest mould, and the best part of the manure of the uplands, is settled, let off the clear water. As to the spring overflowing, it should be done at the beginning of April: the water should lie upon the ground long enough to moisten the root of the grass thoroughly, and nothing more; after which it should be let off, and the growth should go on unmolested for the hay. The aftermath may in very dry seasons require a second over-flowing; but the water should in this case be left but a very little while upon the land, because if it be longer, the surface will not well bear the feet of the cattle that are to feed on it. Wet pastures are the proper food for the latter end of summer, and those which lie dry for winter. Therefore let the low grass grounds be eaten down close before the rains of autumn; and when they have had the rolling for that season, let them be shut up.

The manures for grass grounds remain to be considered; and the way of laying them on to the most advantage. The best of all manures, in general,

general, is old and very rotten dung: but with this other ingredients may be often used beneficially, according to the nature of the soil, and general condition of the ground in its produce. As to such lands as lie with the advantages we have mentioned, in speaking of the best kinds of all, the dung of cattle, feeding on the aftermath, will in a great measure dress them; and all that can be required farther, will be some old dung well rotted once in four years.

When the soil is a somewhat poorer loam, pond mud should be mixed with such old dung: and when the crop is oft to be thin in a yet poorer land of the loamy kind, pond mud, old dung, and the rotted mould from the bottom of an old hay stack, rich with the decayed leaves, and full of seeds of the hay, is the fittest.

When moss is apt to breed among the bottom, the best manure is a mixture of coal and wood-ashes, three parts of the former and one part of the latter, with some mixture of urine. The best way of getting this, is to mix up the ashes in a heap, in some part near the back of the house, and to empty the pots upon this heap continually.

When the grass is eaten down in autumn as close as possible, this dressing should be strewed on: then it takes effect upon the shoots of the moss, which are principally made at that season, and which lying bare to receive it are destroyed. A month after some clover seed should be scattered over the ground, and then some old dung. Thus

the sharp dressing acts upon the moss alone, and after this the seeds of the new bottom are encouraged by fresh manure to shoot; what remains of the effect of the ashes and urine, assisting, not preventing it.

In a poor dry pasture, the best manure is the dung of fowls mixed up with some good mould. A little of this goes a great way: and the time of sprinkling it on the ground is in the beginning of April, when the grass is about to make its best shoot for hay, the others are best used in winter.

For cold land, such as has a clayey soil or tough loam, pigeons dung and foot make the very best manure. These, being well mixed together, are to be sprinkled on also in spring; as the farmers give what they call a top dressing to their corn.

For a pasture ground of a poor loamy soil, nothing is equal to the tough kind of marle: we have great quantities of this in England, and it is of the aspect of clay. This is to be laid on in winter, and it will dissolve before spring. 'Tis common in many places, where it is taken for clay; and neglected: in colour, it is blueish or yellowish, and the way to try it, is to put a piece into a basin of water; it will hiss, and soon moulder to powder, whereas the real clay will lie in a heavy lump. This is worth the farmer's notice, because marle of any kind is a treasure, and this kind will answer for more purposes.

poses than are here named. Of this we shall treat hereafter, speaking of manures.

A poor brown hungry soil is frequent in upland pastures, and for such the best manure is soft chalk.

In stony soils, the best of all manures is lime; but if marle and pond mud be also used, they will amend the land itself, while the lime assists the present growth.

In absolutely sandy grounds, the grass, tho' sweet, will be very small in quantity, and the proper manure for these is a tough loam. Clay itself would improve them, but it cannot be dissolved upon a sward land: therefore a loam which will break to pieces with frost and rain, and carries in a great deal of clay and some good mould with it, is the proper choice.

The time of laying these manures upon the ground is winter; that the frosts may break them, and the rains carry their best parts into the soil before the spring. Such as are hardest, and will require the longest time to dissolve, should be laid on earliest, and the others in proportion later. In all these cases, the method of using them is to mix the several ingredients well together, where it is a mixed manure, and then to drop it in small parcels from the tail of a cart: a labourer is to follow, and to break and spread these with a spade; and then to draw a bush harrow slightly over the ground, which will spread them more thoroughly. After this in spring, the rubbish,
that

that may have been brought on with them, is to be picked off, and the ground then left to itself.

The management of the grafs for hay and feeding is an article, in which the various circumstances of particular farms may make a great alteration; but yet some general rule may be laid down upon that head. Where the ground is well managed, there may be a great deal of feeding time, both in autumn and spring, as well as during winter; for the best method is certainly to cut but one crop of hay, and this requires only fourteen weeks for its growth. Therefore all the rest of the year remains for feeding, except a short space for the first growth of the aftermath; and once in three or four years a respite for dunging.

In the most improved places, the ground may generally be laid up for grafs in the beginning of March, and it will be ready to cut toward the middle of June, which will give time, if the farmer chuses it, for the growth of a second crop; but that is rarely adviseable: therefore, after a short time for the next shoot to grow up a few inches, it may be fed, and so on till the following March again; only giving it time to recruit after it is each time eaten down; by taking out the cattle for a short space.

In less improved places, they feed the grafs grounds much later in spring; and in our Northern counties, the second week in May,

is no unusual time for laying up the ground for hay. The right time to take off the cattle, is when the bud for a stalk and ear of the grass are pushing out of the ground. Till this time the cattle can do no harm, for they eat only the blade, which will readily be recruited; nor can they possibly hurt what is yet in the ground. But if by trampling or biting close after the bud or a stalk is up, they crush it to pieces or eat it away, 'tis very slowly, difficultly, and imperfectly, that nature repairs the loss the same season. 'Tis, therefore, the time of this shoot piercing the ground, that is the exact period for laying up the close for hay. This bud rises earlier in the year in the Southern than in the Northern parts of England; and is up sooner also in proportion to the natural richness of the ground, or the quantity of manure that has been used upon it. Therefore no fixed time can be laid down for all places: but in general, the month of March, or at farthest the beginning of April, should be the season: and the curious husbandman may always be directed exactly by examining the ground, and looking to the state of the buds. A few weeks more feeding time should never influence him to run the hazard of losing his hay crop; and at the best, if the cattle have damaged the buds, this can be but very poor; and if a dry season follow, the grass would scarce rise to hay at all. As soon as the cattle are taken off the ground, a labourer with a shovel should be sent

sent in to break and spread the dung; and to pick off any accidental rubbish that may have fallen upon the surface since the former cleaning. Thus all will be prepared for the scythe, and this last scattering of the dung will be of great service to give strength to the new shoot. If, after all this, he will allow the ground another rolling, it will be of great additional service. This is the most perfect manner of preparing for hay, and the expence is not much; if any article is omitted, the crop will be worse by much more than the saving. This last rolling, which is not of absolute necessity, is yet a considerable advantage; and there are some grounds where it cannot be omitted without damage: these are such as have some moisture, and a rich black mould for the soil. The feet of cattle will have poached these a little in winter, and worm casts will be cast up in abundance in spring. These will make irregularities in the ground, and prevent that even growth of the grass, which is so beneficial to the crop, and so pleasing to the mowers. The last rolling flattens the worm casts, which then make a kind of manure; and pressing the sides of the hollows made by the cattles feet down, so as almost to fill them up, make also that nearly level. In those new made pasture grounds, we have directed to be laid down from tillage, there will be no danger of anthills ever rising, if this business of rolling be properly performed, because

because it will crush the first attempts, and kill great numbers of the creatures, and scatter the rest. In those pasture grounds, which have been subject to anthills, and have been cleared of them, more than ordinary care must be taken in this article of rolling, because it will in the same manner prevent the mischief from returning, which otherwise in spite of all possible care it is very apt to do.

When the hay is ready for mowing, no time should be lost, for there is a certain season for its ripeness; and if this be passed over, it immediately begins to waste and decay. 'Tis better to cut it a little before than after; because it will feed a little as it lies upon the ground: but they do very wrong who cut their first crop before it is ripe, for the sake of favouring a second; for it is upon the first and proper crop of hay the farmer is to place his dependence; the second is precarious, and, at best, but trifling in comparison.

As the true ripeness of grass for hay is an article of so much importance to be known, the farmer should attend carefully to every thing that can shew and ascertain him of it. When the ear of the grass has grown to its full size, and we see a kind of little ragged white threads hanging from the husks, the grass is ripe, for this is properly its flower; and when this falls off, which it does in a very few days, the plant sets for seed, and the leaves wither. So long as the plant is approaching to the time
of

of flowering, the leaves are growing: while it is in flower, they keep in their state of perfection; and when it ceases flowering, they decay: therefore those, who cut the grass for hay before it flowers, have neither the full quantity of hay nor the due strength of the ear: and those, who let it stand to seed, hurt both the blade and the stalk, for they both decay visibly from the falling of the flower. All the plants of grass in a field will not flower together; no more will those of any other crop ripen all at a time: but in this as all other instances, the farmer is to be guided by the generality of the crop; and not to let the forwardest be spoiled by waiting for the latest.

The usual way of judging is by examining the bottom of the grass; but as this does not shew the time of cutting till it is fully come, the farmer, who trusts to this method, may lose a part of his advantages: for not only the quantity of hay, but its smell and colour will be affected by a very little mistake, as to the time of cutting it. When grass is cut before it is ripe, the hay will be of a deep green, and of a heavy smell: what is expected in the finest hay, is a pale olive colour, and a light and fragrance in the scent. This is obtained by cutting the grass just at its time of flowering. After this the stalks grow brown, and then nothing can give a good colour to the hay; and it gets at the same time a faint smell.

The

The mowers who generally engage by the acre, not by the day, are very apt to flight their work, and the commonest fault of all is their cutting the grass too high; that is leaving too much at the bottom. They have an excuse when the ground has been ill kept, and there are irregularities upon its surface, or rubbish is left upon it. But when the ground is in the excellent order here directed, nothing hinders them from mowing close. This will add, perhaps, two inches to the length of the hay, which is often equal to a tenth part of the whole; for the bottom is much thicker than the top, and it is equal to it in goodness when the hay has been thus managed; and the aftermath grows the faster for this close mowing.

When the grass is cut, it will be improved by some time lying on the ground. Therefore let it have this advantage without disturbance. The best method is to allow it to lie two days and a half in the swarth. All this time it will be swelling and improving: after this it would grow soft and fade. When the time of its improvement is over, the faster it is made into hay the better: therefore at the end of two days and a half from the cutting, let it be spread upon the ground. Let it lie thus the rest of the day, and at evening let it be thrown up into little cocks, these are called grass cocks: thus it is to lie all night, and so long in the morning, as till the dew is perfectly off the ground. Then it is to be

spread again, and to lie all day in that open manner. At evening it must be cocked up again. Thus it is in a great measure preserved from the dews of the night; and perfectly exposed to the sun all day, so that it is quickly and very regularly dried. The day after the second time of grass cocking, the hay must be spread out in rows for the wind to play upon it, and in this state it lies ready for drawing up into cocks again; which should always be done when there is any danger of wet. If a shower falls, it must be gathered up into the cocks, and as soon as 'tis blown over, it is to be spread out into the same kind of rows again. By this means the hay will be in a few days very far advanced in the drying; and then the rows are to be drawn up into larger cocks, and left for some days in this manner. After this, when the outsides of these cocks are dry, they are to be broke to pieces; and spread again for the advantage of sun and air to dry what was in the middle. This will be soon done in a good day, and the hay is then finished.

If the weather be rainy when the hay lies upon the ground, it must not be turned while it is wet, but left to dry as it lies; for the ground is damp at such times, and if the wet side of the hay were turned to it, the whole would be spoiled. So easily as this does the making of hay go on when the ground has been well managed, even in bad weather: but when there has been neglect in the former care
of

of the land; things do not go on so well, nor will so little care answer. In particular, when weeds have been suffered in the ground, they bring on a new trouble, for they are cut with the hay, and they must be dried with it; there being no possibility of separating them after it is down. This makes the hay-making tedious, and if great care be not used, will spoil the colour and scent of the hay. The stalks of grass are naturally of a dry nature, and what juice they contain wastes away in a very little time in the method here directed for their management; but the stalks of many weeds are thick and juicy; and these in the very best seasons take a great deal of time in drying, and in bad weather they can scarce be dried at all: they impair the fine colour of the hay, and give it a musty flavour. In these cases, double care is requisite; and it may be a lesson to the farmer for many other things, that a little timely expence is often a great deal of saving: for a third part of the money would have paid for weeding the ground, that it now costs in the extraordinary expence of making.

The old custom still is preserved in some places of putting up the hay in barns, but it never keeps so well as out of doors. Too much care cannot be taken, that the hay is well made, and that it is carefully stacked, for the want of these cautions, will subject it to injuries every where; but when it is in good condition at the time of putting up, it will be

N

sweeter

sweeter and keep its colour much the better for being in a free air. The practice of the old farmers, of making it a rule to give a year of fallow once in three seasons to the grass grounds, only eating them off, and cutting no hay, may still be needful to be observed in some grounds; but in general a proper use of the aftermath will answer the purpose; and where the land is kept in heart, and only one crop of hay is cut in the year, the assistance of a little manure in winter, and the dung of the beasts in feeding at other times, will perfectly well supply the ground for a crop every summer.

In the common course of things, when the hay has been carried off the ground, and it has been allowed some little time for a new shoot, it will be ready for cattle. The larger kinds are to be turned in first, and when these have eat it down as far as they chuse, sheep must be put in to feed upon the rest. They will find a vast deal of nourishment where the cows and oxen had done; and their warm dung, mixing with the colder kind from the others, will be together of excellent service. Thus when the sheep are taken off, there will be a time for the growth to recruit against the next feeding; and this will be assisted in a very great degree by the manure, which is in that manner left upon the ground.

C H A P. XII.

Of the Pulse kinds.

WE have now gone thro' the culture of the corns, the turnep, and the natural and artificial grasses: the next crops in the farmer's estimation are the pulse kinds. The principal of these are the bean and peay but the tare is also useful; and there are several lesser articles of the same kind, as the chiches which our people call the toches, the lentill and some others, which serve as fodder, and have also a singular use in preparing the ground for more important crops. As they root slightly, they exhaust very little nourishment, and as their stalks cover the ground, they mellow and improve it. Among the pulse kind, the first place is due to the bean, and of this we shall therefore first give the culture.

C H A P. XIII.

The management of a crop of beans.

OUR ancestors, who had but a small change of crops for their tillage ground, were obliged to bring in the bean frequently, and cultivate it in a certain course, almost on all their land; but with us the introduction of new plants has so enlarged the number and variety,

that we may chuse our ground for each kind, and need never raise any one upon a soil which does not suit its growth. The modern farmer, having this choice of his land, is to sow beans only upon a strong and firm soil, where there is some moisture, a tough loam, which is rendered black by a large mixture of good mould in it, is of all other lands the very best. They still thrive very well also in that black deep earth which is upon the borders of fenney ground; and wherever their roots can be kept moist and defended from the sun. Therefore light, dry, and warm lands are never proper for this crop: we seldom see any tolerable growth of them upon such ground, and usually insects destroy the plants in their first shoot. The situation of the land is another article of consequence for a bean crop. They require air, and yet will not bear too much exposure. Experience shews, that in small enclosures beans by no means succeed; nor will they ever produce an abundant crop upon hilly ground. The properest situation, therefore, is in some large enclosure in the flat ground, where they are safe from blasts by the place being under cover, and where yet there is a free course of air, and moisture at the bottom. Among the great variety of crops the farmer now has in his choice, these articles alone should give the preference. The bean should be always raised when he has such ground, and not otherwise; and will have a double produce, and little hazard

off the success; whereas in ill chosen land, with half the expectation, he is exposed to an equal hazard, whether the crop shall not be lost in its first period of growth.

This choice of the land being made, the preparation of it for the crop lies in a very small compass; for as it naturally follows some other of a more valuable kind, the great part of this has been executed before. The corn itself serves to prepare it in succession for corn, and in particular for wheat; for the beans shade and mellow the ground with their tall stalks; and as they must be kept weeded, or they will yield little produce, the same weedings render the ground clean for the growth of the corn. The greatest quantities of horse beans have been seen in the flat part of Buckinghamshire: and the farmers bestowing sufficient care upon them, as well as taking a fine and exactly right soil, have obtained crops which have been more valuable than any, except wheat; and sometimes equal even to that. Eighty five good pods I have frequently counted upon one stalk, in ground thus chosen and thus managed; and the produce of this kind reserved to sell at a time when the summer has been unfavourable, has brought a great profit. Beans, when well stacked, will keep three years; and within that time there is little doubt of a good market.

The finer the ground is made for the reception of the seed in any kind, the better the crop

will succeed ; and this cannot be more true in any thing than beans : but as they follow corn usually, a little dressing of the land does for them, it being in order already. When they are raised in the common old method, the ground will require the more preparation, because it can be but little assisted afterwards ; but in the new way with the horse-hoe, there is less occasion for the first care, as they can be from time to time helped afterwards.

The culture of the garden bean and horse bean, is so much the same, that the farmer who lives near a great town, or in the way of a large demand, may raise the garden kinds at pleasure, by the same methods as we shall lay down for the horse-bean ; but he is to consider this latter as his more proper concern, for the value and use of a crop of horse-beans are universal.

In the choice of seed, he is to have regard to the two kinds : these are the common horse-bean, which was the only sort heretofore known to the farmer ; and the tick bean or larger horse bean of late introduced, which where the ground is proper for it, is much more valuable than the other. This tick bean is as large as the small hotspur bean, and answers all the purposes of horse beans, better than the common kind, but it requires more culture and a better soil. Therefore if the soil and situation of the ground, intended for a bean crop, be fully such as here directed, let the farmer get the

the true tick bean for seed, he will know it by the size, and the fresh and fine colour: the best are to be had from the Hertfordshire farmers, and they should be found and of the last years growth: for tho' they will shoot at two or more years old, the plants are never so strong; and for that reason the crop is much more subject, in its first growth, to that mischievous insect the dolphin fly; which, in dry seasons, is often as fatal to the bean crop, as the turnep fly to that kind.

If the farmer finds it convenient to sow beans, when he has not a soil altogether so proper, he should chuse the common horse bean; which, tho' inferior to the tick, will thrive with less nourishment. If he chuses to meddle with the garden beans, the hotspur, toker and Sandwich are the best kinds; or the broad Windsor, if his ground be very rich and well sheltered. There is also a new kind now coming into great use, called, from its low stature, the DWARF BEAN; this, tho' cultivated principally in gardens, I have found succeed very well in the field, and tho' not above seven inches high, it is a great bearer, being covered from the bottom to the top with pods. The nourishment, which in the common kinds runs up into a high stalk, is in this given entirely to the pods.

Whatever kind of bean is chosen, there will be a great advantage in steeping it, but the liquor does not require those disagreeable ingredients, which are sometimes used for corn.

The intent, in steeping beans, is to give them a great deal of internal strength for making the first shoot; and it is very useful, because the crop will be in most danger while very young: and the entire growth afterwards will in a great measure depend upon the first effort of nature being strong. I have known milk used for the steeping of beans; but I never saw any more good from it, than if common water had been used; that is, it made the bean shoot the sooner, but without any more strength. Some have used lime water, and others brine of common salt, from both of which, in moderation, I have seen advantage; but, on the contrary, damage to the crop, when they have made the brine too strong or steeped the seed too long. What I have found most serviceable, is a liquor impregnated with good manure, and this I shall advise every farmer to use. Put into a large tub three pecks of dry sheeps dung, two pecks of pigeons dung, a bushel of the dung of common fowls, and a bushel and half of very old and well rotted horse dung, from a good old dunghill; pour upon these a hoghead of soft water; stir them well about with a birch broom, and let the whole stand together twelve hours, repeating the stirring of it once in an hour: then let it settle and draw off the liquor into another vessel, thro' a sieve. Into this put as many beans as will well lie wet in it; and let them

them lie four and twenty hours. Then take them out and immediately plant them.

This liquor is founded upon the Abbe Vallemont's receipt for a steep; only without the sharp ingredients; because I have never found them useful: I think on the contrary hurtful. Our country writer Ellis found the Benefit of what he calls mudhill hole water in steeping of seeds; he means the red liquor that runs from wet dunghills: but in that there is less strength and virtue than in this fresh prepared steep; because it is impregnated only with one ingredient, and even from that the best virtue is evaporated. This mixed liquor has only the strength and efficacy of a rich manure; but being admitted into the body of the bean, it gives a strength and vigour to the first shoot, equal to what it would have had from ever so large a quantity of dung in the land; and the plants, being thus established, will keep strong afterwards thro' their whole growth.

The best time for sowing horse beans, is the middle of February, the common sort a little sooner than the tick Bean; but that should never be out of the ground longer than the three or four and twentieth of that month, in the coldest grounds; and in those which are a little warmer, not so long.

There are various methods of putting them into the ground: the favourers of the new husbandry prefer the horse-hoeing distance; but, in the common course, they may be either sown

sown by broad cast or planted by hand. The coarse way of sowing seems most allowable when the common horse bean is sown, and that upon ground which does not allow any great prospect of abundance in the crop; but when the tick bean is used, and the steeping method followed, they should be planted by hand.

When they are sown at random, the best way is this. Chuse the soundest and best beans of this common kind, and take four bushels and a half for every acre. Plow up the land carefully, and about the fourteenth of February sow the beans by broad cast, going twice over a place, and plow them in. This makes short work of the article of sowing, nor do these beans need steeping. Thus let the ground lie, till the beans begin to shew themselves above the surface. By this time there will also appear the first shoot of the weeds; and the ground is then to be harrowed, which will at the same time answer the natural purpose of harrowing for the beans, and will destroy this first crop of weeds. A short toothed harrow must be used for this purpose, and the work is to be done with care, not to tear up the beans. Let the ground lie thus three days, and when it has taken in the benefit of the air and dews for its new broken surface, bring on a heavy roller and go carefully over the whole field. This presses down the mould which the harrow had broken, and
 nwol which

which the weather has in those few days somewhat mellowed; and the roots of the beans are well fixed by it. At the same time the surface is laid level for the time of mowing. A scythe will take such a field entire with the greatest ease and regularity. After this, provided the ground has been tolerably clean, there will not be any growth of weeds of great consequence. If otherwise, and they appear rank, it will be best to allow one good weeding, not only for the sake of the crop, but the future benefit of the land.

When the land is excellent in its kind, and the tick bean is chosen, and the farmer takes the trouble of steeping, and intends to allow the crop all the other advantages, the first should be the planting the beans by hand. This is to be done by means of a setting stick, which they call in some places a dibber.

It should be made of the handle of an old spade, cut off eight or ten inches below the hole, and pointed with iron; which iron part should be notched upwards in the manner of beards, to prevent the hole being too smooth at the sides. For this purpose the ground is to be plowed light and hollow, and the beans, fresh from the steeping, are to be given to the women employed in this work. Then a gardener's line being stretched within a foot of the edge of the field, the women are to be directed to plant along that; opening a hole with the dibble at every six inches, and dropping in a bean.

beam. When they have gone the length of the line, they start to carry it straight forward, till they have made one complete row, at a foot from the edge of the field; and then they are to stretch it again at eighteen inches distance from the first row, and there plant another. Thus the whole field is to be planted in rows at eighteen inches distance, and with the beams at six inches distance in the rows. A great deal of care must be taken in the planting, that all the beans be let in nearly at the same depth which should be about three inches, and that the hole be made with one stroke of the dibble, jebbing it straight down and pulling it lightly up again; for if it be turned in the hole or pressed on any side, it makes the mould cake there, and the roots of the young beans cannot pierce it. The ground is to be all harrowed over, immediately after sowing, and this covers up the beans regularly. The expence of this, tho' it is done by hand, is not great. The women work by the great at three shillings the bushel of beans in our counties, where labour is dearest; and for much less where hands are more plentiful and labour cheaper. I have always found these crops yield much better than those sown by the broad cast way; and they always leave the ground in better condition, because the regular planting of them gives an opportunity of weeding them with great ease. When the beans just shew their heads above the ground, the whole field should be rolled; this

this fixes the mould to their roots, and levels the surface for the mowers; and at the same time it crushes, in some degree, the light rooted seedling crop of weeds. When the beans are half a foot high, the whole ground should be hand-hoed; and this again repeated when they begin to pod. The expence will be abundantly answered by the great produce, and the ground will be in excellent condition for another crop.

These are the ways of raising beans by the common method of husbandry: the latter of them agrees in a great measure with the garden practice, and indeed differs in nothing from the horse-hoeing method, but that this practice plants at a greater distance, and gives means for the horse-hoe, instead of the hand-hoe.

The drill has been so improved, as to be also capable of setting beans expeditiously and regularly. The most convenient way of using this, is by chusing a dry day, when rain is to be expected very soon: but when the season is not so favourable as to allow of this, it is still a very good method to plant them in regular drills, opened by a common foot plow, with a picked share. The ground must be in good tilth, and when the drills are thus made at a moderate distance, the same plow is to be drawn back between them. This turns up the mould, and, leaving a hollow, makes it easy work to cover the beans in the drills. This is to be done with a broad hand-hoe, and is easy
and

and quick work. The best distance of the rows in this disposition is three foot: and they are, therefore, easily kept clean afterwards. The garden beans of the largest kinds may be raised very successfully by the same method; and in either case the crop is easily managed, and the ground will be left in good condition afterwards.

Though the general custom is to plant beans alone, they may be conveniently enough sown with hog-pease; and in some cases with a great deal of advantage. When the ground lies too open, or is otherwise so situated, that there is danger the crop of beans may miscarry, this method of sowing pease with the beans gives the chance of a second crop that shall succeed. It often happens so: for the same accidents which hurt beans in their growth, do not affect pease: and on the contrary, if both succeed, the crop will be at least as valuable as a good one of beans; for tho' neither of them alone will produce so much as would have been had from a single crop of either of the kinds, yet the quantity of pease will very well make amends for what is wanting of the beans, and they may be used together. A dry season after sowing will often cause the beans to fail; or the dolphin fly will attack and devour them as soon as they are up: but neither of these will kill or hurt the pease, they will lie good till the rains, and then sprout; and the fly, so fatal to the bean, does not meddle with the pea. On the

the other hand, pease are also liable to accidents, which do not destroy beans. If May be wet and cold, the pease in moist fields will be destroyed, but the beans will thrive the better for it. Therefore as the accidents which threaten these two crops are of a contrary kind, and they are plants that will grow very well in the same spot of ground together; there is reason why the farmer should in hazardous places sow the two kinds thus. The practice is new, but experience has in most instances shewn that it proves advantageous. There is a plain reason why beans succeed the better in hazardous grounds, for having pease among them, which is that the bean grows best when it is kept continually moist about the root; and the pea stalks answer this purpose, for they shade the ground and keep it continually moist and mellow between them, wherever the fibres of the bean roots run. There are two kinds of the hog pea fit for this service of sowing with horse-beans; they are the WINDSOR GREY PEA and the HORN GREY; of these, the latter is the hardiest, but the Windsor is the better bearer. Therefore when the common horse-bean is the kind sown, I would advise the horn grey to be the pea sown with it; and when the tick bean, the Windsor pea should accompany it. The horn grey will bear to be sown early in February, or even sooner, if any one desires it. I have seen this and the horn pea sown in the depth of winter, yet succeed.

The

The tick bean is tenderer, and so is the Wind-
 for grey pea; but after the middle of February,
 they will bear to be put into the ground toge-
 ther. The quantity of beans should be double
 to that of pease, when they are sown together:
 for in this case there will be enough of the peas
 stalks to shelter the ground, and at the same
 time there will be also a sufficient quantity of
 the bean stalks to support the main stems of
 the pease. I have seen equal quantities sown,
 and in that case, if the season has been favou-
 rable for beans, it has done very well; but if
 the beans have succeeded ill, and the pease
 have throve, the quantity of pease stalks has
 weighed down the beans, and both lying on
 the ground, the rains have rotted them; and
 the crop has come to little. The best ground,
 which is intended for beans, should be sown
 with them alone: this is only an expedient
 for making what is less proper answer for that
 purpose. It is not only that horse beans of a
 good kind will bear sufficiently in good and fit
 land alone; but in that kind of ground, the
 pease would be too luxuriant in stalk, and
 over-run the beans, till neither came to any
 good.

When beans and pease are sown together, it
 should be done by the broad cast way, going
 twice over a place. The ground should have
 two plowings to make it loose to receive them,
 and they should then be plowed shallow in:
 after which the harrow must be brought over

the ground ; and after the roller, when the plants begin to appear, the rest of the management must be the same as in lands sown by the broad cast-way with beans alone. Those who shall chuse to sow the mixed seeds more regularly, may do it by means of a foot-plough, opening drills for them at a yard distance, and then covering them up with the hand-hoe ; for they cannot be drill'd out of any drill-box together, because of the different size of pea and bean. This method of sowing them in drills will give room for culture while they are in the ground, and the field will by that means also be clear'd from weeds, and well prepar'd for the following crops.

One thing there is further, which though I have not got Experience for the practice yet, I propose to try with regard to beans planted as above ; and which from the great opinion I have of its success, I would also recommend to others. It is the doubling the quantity of seed by planting two beans in every hole, instead of one. The *French* all agree, that when half a dozen corns of wheat are put into the ground together, provided there be a due distance between one such parcel and another, they grow up to as good plants, as if only one single corn had been put there. Now, supposing this to be the case with beans, which is equally natural there will first be the certain advantage that no hole fails of producing its plant, as it otherwise may, by the failing of the single bean

O

put

put in; and if any thing like the success follows, which the *French* speak of it, in that other article would be a vast addition to the crop. There is no plant whose produce may be increased in a greater degree than the bean. Even so long since as the *Roman Pliny*, there had been seen plants with a hundred pods upon a stalk: and if any thing near this could in general be produced by good culture, in beans at six inches distance in near rows, and rais'd two always together, it would be hard to say what crop could be produced upon the land, that could be more advantageous to the farmer. These are trials such as the common practice should allow: they are safe and easy. A man may make this experiment in any odd corner of a bean field, and marking the place he will soon see by the stalks and their produce, whether it will be worth his while to sow a whole field so in the next season. The same methods of sowing have their different advantages and inconveniences. The old way was to prepare the land and let it lie awhile before sowing, and then to sow by broad cast; but this was wrong: Nothing is more advantageous than sowing upon new broken ground, and when that method is followed, it should always be just upon the plowing. The better way is that of plowing them in, or sowing, as just named, under furrow; but care must be taken not to cover them too deep; and not to let them lie hollow. This preserves the seed from birds, and from other damages.

damages. The drill plough will deliver them very regularly, but it will not be worked conveniently in the strong soils where beans grow best of all : this gives the advantage to planting by hand, especially if it should be found, that the double sowing, here mentioned, shall be found to succeed ; and that the ground is nearly as able to support the plants in pairs as single. The seed should always be obtained by exchange from a farmer at some distance, and from beans which have grown on a soil very different from that whereon they are intended to be sown ; and as we have now sufficient changes of crops, by the great variety of artificial grasses and the like, the farmer should never be too quick in bringing on a second crop of beans to the same ground. He may be tempted to this, because certain parts of his land are in a peculiar manner favourable to beans ; but he had better allow other crops to those, and sow beans again upon a soil less favourable. There are plants which will bear to be raised on the same ground better or worse than others, but the bean worst of all.

According to the different manner in which beans are sown, they are at harvest to be cut with a hook, or mown with a scythe. This last is the short way, and will answer best of all upon lands sown in the promiscuous manner, and which have been well roll'd in spring. When they are drill'd or planted in rows, the hook answers best. Which ever way they are

cut they must be carefully cur'd upon the ground ; for often long keeping brings a large price ; and where they are well dry'd at first there is little danger of this. They should be two days and a half upon the ground without turning : then they should be turn'd and thrown upon a dry part of the field. If any wet falls, they must lie till it's dry'd off before they are turn'd again ; and they should never be moved while wet with the dew : they must be always thrown up hollow, that the wind may play among them ; and they must in this manner be turn'd from time to time, till the whole stalk as well as pods is nearly dry'd. When they are harden'd in this manner, they are to be rais'd up in moderate bundles to perfect the drying. The method is to gather the stalks even in parcels, and tie them round the middle, and then set them up at equal distances over the field. After this they should be very carefully slack'd and kept till wanted. They may be kept also thrash'd ; and this way lie in a small compass : they are in some places put up in four-bushel sacks, and these, being set out of the way of vermin, will keep good till there is a demand for them.

Thus is the horse-bean to be managed according to the old husbandry. But as the farmer may chuse to try the effect of the horse-hoeing practise upon this crop, we shall lay down the methods which have been found to succeed best in that way ; for there are not wanting

wanting precedents of it ; and those, who have used the method, boast greatly of its advantages. The way of planting beans in drills might very naturally lead to this ; and may as rationally give the farmer hopes of success : for the new method will only require to place the rows somewhat more distant, and to use the horse instead of the hand-hoe. By what we have found, the more distant the rows, and the better the culture while the beans were growing, the larger have been the crops. It would be easy to infer this, by reason, as to the use of the horse-hoeing husbandry for the bean : and we have also the confirmation of exprience : but still all isto be understood with due regulation. The intent of this new husbandry is to improve bad land, and make labour serve in the stead of manure : therefore if the ground be good and in due heart, there is no need of it. If the farmer has such a piece of land as we have describ'd, in all respects suited to beans, it would be idle to think of calling in the assistance of these new methods: but if he finds it convenient to raise this crop, when he has no ground that is by nature proper for it ; then the true method will be to call in this assistance. In such case the ground must be very well broke by the plough, and when it is in fine tilth, the beans must be drill'd in by the drill-plough, with a bean-box, in rows a yard asunder. The beans should lie at about three inches distance in the drills : and by this means,

less than a third part of the usual quantity of seed will be sufficient ; for about five pecks to an acre will be all that are requir'd in this method. As soon as the beans appear above the surface, the horse-hoe must be brought into the intervals to break up the ground, and destroy the weeds. There will require two more ploughings of the same kind ; the one when the beans are about seven inches high, and the other when the pods begin to be form'd. Thus a poor piece of ground, naturally improper for beans, will be made to produce large crops of them, at the expence of four plowings to prepare the surface for the sowing, and three horse-hoeings. The expence of all this labour is something to be consider'd, but to do justice to the new method, I think the crop will be such as very well to answer the extraordinary charge, in comparison of what it would have been in the usual way ; and there will be a great advantage in the ground being in so excellent order afterwards. The beans which are rais'd in this method are always short in the stalk and full of fruit ; whereas when they stand close in the promiscuous way of sowing, they draw one another up : the stalks then are tall and weak, and the beans few in proportion. Thus let the farmer in all instances inform himself of what is the real advantage on each side, and not on all occasions use the horse-hoeing method ; much less entirely reject it. When it appears from reason, experience,

and

and the common nature of things, that it will be serviceable, he is very wrong if any vulgar prejudice prevents his doing it : the instruments are few, cheap, and lasting ; and no farmer, who has a large tract of ground with various soils, should be without them.

C H A P. XIV.

Of Pease.

THE next in value of the pulse kind to the bean in the husbandman's catalogue is the hog-pea. It makes a change in the course of the crops ; it improves the ground ; and with tolerable management, yields a large tho' not a high-pric'd produce.

In the neighbourhood of great towns, the farmer often finds his advantage in raising pease of the better kind, for our tables ; but his proper concern is that large coarse sort which feeds his hogs, and is fit for his other occasions ; and will keep to be carried to market at his pleasure.

As he has variety of crops, at least equal to all the variety of soils, he may even in this slight instance suit the ground to its intended produce : and upon this choice will always depend, in a great measure, the benefits of these crops. Even the growth of the stalks is some consideration, for they make an excellent fodder for horses, oxen, and sheep, in the winter
and

and spring, when food is scarce for them. The coarser kind of horses are kept in excellent heart for the drudgery of their service, by the dried pease; and they are so peculiar for hogs, that there is no feeding up those creatures to perfection without them.

Pease have the advantage over beans in the farmer's consideration in that, there are but few lands which agree well with the bean: but one or other kind of the pea will suit with any. The poorest will produce very good crops, when the kind of pea is well suited to them; and from such as are better, there will be a vast abundance; and at the same time, they mellow and clean the ground; sheltering it and keeping it hollow with their spreading stalks, and permitting no growth of weeds. To direct the farmer rationally in his choice of ground for these crops, we must first explain to him the more usual kinds of pease for the field culture.

The most frequent of all these, and that which was originally called the hog pea, is the kind we now name the WINDSOR GREY: this is large and of a blue-grey colour, hardy enough to admit of early sowing, and will always thrive where there is a good hold for its roots, and some moisture. LOAMS are the best soil for this pea, and in such of these as are stiff and moist, it will bear a vast quantity, but it is a slow grower and ripens late.

The HORN GREY is a new pea among the farmers of many of our counties, but it is now getting

getting into great repute for its hardiness. The pea is large and firm, and in colour paler than the Windsor. It will grow upon light SANDY LOAMS, and produces vast encrease. This fattens and perfects the hogs as well as the Windsor grey. There was a yet hardier kind that was in great use at one time, called the iron grey pea; but it is found now to be vastly inferior to this. The COBHAM PEA is another of the large grey kind, and is superior to the horn grey and Windsor, but it is tenderer than either of them. It requires a fine and good soil, the more like garden ground the better; and this must be well prepared, and it must be sown late. These are disadvantages to the farmer, but its great bearing, and the excellence of the pea itself, make amends; and when he has A RICH BLACK MOULD for a pea crop, this will be his best choice: it will yield a vast abundance, and will leave the ground better than it was. This is a late pea. There is also a Cobham white, which the farmers in some parts begin to esteem beyond the grey; but it is somewhat tenderer.

The large white hog pea, cultivated in some parts of Hertfordshire, and which they call the PURLAN PEA, that is, the POOR LAND PEA is one of the Cobham kind, but different from the former, in that it bears a very ordinary soil, and will yet yield a large encrease. This is suited to the hungry gravels and stony lands.

The

The iron grey pea is a very hardy one, of a dusky colour and thick coat. It will grow on chalky or white poor land, where the other pea crops fail; though its most favourite soil is a rich loam. Tho' the better kinds have put this out of use in a great measure, yet the peculiarity of the suiting a soil on which the others will not thrive, is a thing of consequence; and may in many cases be a great recommendation.

These are the kinds of pease principally in use, and there are several other lesser varieties. From one or other of these kinds, the farmer may raise a good crop upon any sort of land, and if he chuses any of the lesser varieties, he may judge of them by the resemblance they bear to one or other of these: for according to that, they are to be suited to a like soil. In general, the less the land has been manured, the earlier the pease will ripen; but the produce will be greater, as the land is more enriched.

If pease be sown early, and the weather prove tolerably favourable, they require no steeping, therefore this article is of small consideration: but when it happens that the farmer has a dry soil, and as his pease are late out of the ground, he will do well to give them the advantage of a good soaking, in the same liquor that was directed for steeping of beans; only omitting the pigeons dung. This will give them a strong first shoot, and they will afterwards make good
their

their growth much the better for it to the harvest.

Pease naturally follow the crops of corn; preparing the land for corn again. They very frequently will come properly upon a ground that has just borne barley, and they will succeed nowhere better. For the ground having been well tilled for the wheat crop, which had preceeded the barley, and having had also that portion of fresh tillage necessary to prepare it for the barley, is now in a state of extream fineness, though much exhausted of its best nourishment: and when the earth is fine, pease will always succeed. Only when pease have come before the barley, they are not to be sown upon the land next after it again; for the pea so far partakes of the nature of the bean, that it does not succeed well in a quick repetition upon the same ground. All the pulse kinds have more of this particularity than the corns, but the bean and pea most. There are varieties enough of crops: and therefore the farmer need not, nor should not let pulse follow pulse, though a barley crop, has once come between.

The best time for sowing field pease in general, is February. Sooner than this, they never should be put into the ground; and if much later, they will ripen in tolerable time for harvest. Yet this rule is not without exception: for if the end of January be very mild, and there is a prospect of open weather, the farmer

farmer may sow his pease, if the soil be warm, and the situation such that it lies dry; and the hardiest kinds are chosen for it. So on the other hand, when the early part of the year is severe, and good kinds of pease are to be raised in a moist soil, it will be very proper to defer the sowing till March. The discretion of the husbandman must be his guide on this, as on other the like occasions: all that books can do, is to give general directions, and explain the reasons of the practice: when he knows these, he will easily direct himself in the common accidents, that may relate to his own particular concerns. The horn grey is the best kind to sow in January, for it has so much natural strength, that it will recover when it seems to have been spoiled. The best method in this case, is to sow them by broad cast, allowing four bushels to an acre, and to plow them in. On the other hand, if March be come before the pease are in the ground, the farmer must chuse such as are quicker growers than the greys. There are two kinds most fit for this service, these are the Naple pea and Puffin pea; both properly hog pease, tho' tenderer than those usually called by that name: and as they would not bear to be put earlier into the ground, so they will shoot quicker and come better to harvest than the others would, if ever so little too late put into the ground. These kinds require a good soil, and it should be in good order: I would

would also allow all late sown field pease the benefit of steeping.

This is all that concerns the early and late sown pease. The usual and proper general time is February, and according to their kinds, and the nature of the soil, they may be sown at that season various ways. Some prefer the sowing promiscuously, according to the old manner of husbandry; others are altogether for planting them in rows; and this last, as well as the former, is done various ways, and with different distances between the plants, whether by the spaces left between the rows in regular planting, or the greater or lesser allowance of seed in the promiscuous sowing.

In general, which ever way is used, the farmer should have regard to the bigness of the pea, for this is very various in the different kinds, inso-much as to occasion double the quantity of seed in the smaller kinds; though they also are much more numerous in the same measure. In the common way of sowing, two bushels or two and a half to an acre is enough of the largest kinds, for the biggest pease make the largest plants: three bushels of the middling sized ones may be allowed, and of the smallest four. The proportions may be the same in the more regular ways of sowing, though fewer in each kind will then answer the purpose.

A common way of sowing the field pease, is by throwing them by broad cast upon the ground, rough as the plow left it; but this is
the

the worst of all. When any thing like this is intended, as it may be very proper for a hardy pea in a light land, 'tis better to sow by the broad cast and plow it in. The covering is thus thicker; and it is required for the pease sown so early as these kinds are. There is a peculiar kind of rake used in some places for sowing pease, the tines of which are long enough to open drills; and as from its make, several of these are opened at a time, the work is done very expeditiously. The structure of this is like that of the common garden rake, only the cross piece is thicker, and the tines are few and large, five is the best number. The ground being in very good order, the drawing these tines along opens so many drills, into which the pease are dropped, by women who follow the person that draws it; and they are afterwards covered by a short tined harrow. The ground must be light and in good order for this, otherwise it will not open the drills with any regularity. In other places they make the same kind of instrument with the teeth, strait down from the handle, and use it for pease as they do the setting stick or dibble for beans. A man strikes it into the ground, and a woman following him drops a pea into every hole. A light harrowing then covers them; and levels all the surface. Probably in this way, if two pease were dropped into every hole in the place of one, the purpose would be better answered, as the two would give nearly

a certainty, that there should be no miscarriage in any of the holes; and probably the two stems would, in the manner of the cluster'd plants of the corn kind, thrive very well together, and yield a large encrease at harvest.

As the various kinds of pease require to be planted at different distances, there should be one of these instruments for each sort. That for the largest kind of pease, the tines should be six inches asunder; and such an instrument will not be unmanageable, the person pressing it into the ground with his foot, and going backward over the field; the women following. This is a distance also, which will give the best opportunity for putting two pease into each hole, because this measure of half a foot is something considerable, for the clear space of earth between. For the midling kinds of pease, the distance of the tines may be four inches and a half, and for the smallest kinds, three inches; the length of the tines in these several instruments should bear a proportion also to their distance; for the largest pease bear the deepest burying in the ground. The only caution farther should be to work by line; stretching a packthread strait as gardeners do, and working along that: and if between every five and five rows there were left a space of a foot and half; in the way of the intervals of the new husbandry, the whole work would be much the better managed. As this method is preferable greatly to the common way of sowing

ing pease by broad cast, the drill plow exceeds even this as much ; nor is there any crop whatever, that better admits the use of that method. The drill plow may be used for hand-hoeing or for horse-hoeing, but the compleat practise is by adding the use of the horse-hoe, and it is vastly the most beneficial. The best method is to drill in the pease in two rows at a foot distance, and leave an interval of three foot between every two and two. Then when the plants are up, the space between row and row and the ground just on the outside of the rows, should be well clean'd by hand-hoeing ; after which it will be kept clean by the pease themselves, which, getting strength, will not suffer any other thing to grow among them.

When they are four inches high, the horse-hoe should be brought into the intervals ; as also a second time when they begin to flower ; and a third when the pods are growing to their full size. The pease will thus yield a vast produce ; and the intervals will be in excellent condition for bearing of wheat. This is a great advantage of the new method, and it will in the present instance be obtained as fully as if the land had lain for a summer's fallow, and no other crop whatsoever had grown upon it.

Which ever way the pease are sown, the field will require to be weeded soon after they are above the ground ; otherwise they will be starved in the first shoot, and over-power'd by the

the weeds. In the promiscuous way of sowing, this is as needful as in any other, tho' it is very difficultly performed. The hoers must take care not to tread down too much of the crop ; and they must not only hoe up the weeds, but with a judicious hand thin the pease themselves, where they have risen too thick.

When the pease are sown by the rake, or the other implement, whose tines strike into the ground, the weeding is much easier, because here will be no need of thinning the crop ; and the very weeds can only rise in those exact spaces which are left by the regular lines in which the pease were planted. The only disadvantage is, that the hoeing is expensive, and cannot easily be performed more than once. No new crop gets more harm by weeds than this, and therefore the drill and horse-hoe answer best of all for them ; because by this method, the ground is kept clear all the time of thin growth ; and this is of more importance than it could obtain merely from the value of the pea crop, for it clears the land for the succeeding growth of corn. The pease are intended as preparatives for this, and they mellow the ground by covering it : whereas, weeds among them would exhaust it in part ; and as they never fail to lay foundation for a large progeny, they would entail a foulness upon it for the wheat. For this reason, if when the best method is used, namely, that of horse-hoeing,

P

the

the farmer will join the advantage of hand-hoeing after the first horse-hoeing, which cannot be carried any thing close to the rows, he will perform an acceptable service to the succeeding, as well as the present crop: and we can venture to say, he will not repent the expence, when it is come to its full growth. The ripening of the pease in their pod is to be carefully watch'd, for upon that will depend the reaping them at a right season; and this is a very essential article in the value of them. When the pease are very healthy, there is an exsudation of a part of their juice in the manner of that upon ripe plums, which covers the stalk with a kind of blue mould: this never appears but when they are healthy; and if it goes off as the pods begin to form, there is reason to expect a large crop. In those pease which are raised for the table, the garden custom must be observed of gathering the pods as fast as they ripen; but in the field, or hog-pea, the farmer is to watch the best time of cutting the whole crop at once, when there is most upon it; that is, he must take it when most of the pods are ripe and none fallen. This is the time for cutting; for if he stays till some are shed, a great many more will be shed before he is aware, and the loss will be much more than those unaccustomed to these things can imagine: on the other hand, if he cuts them when they seem in general not ripe enough, they will in
some

some manner ripen upon the ground. He is to observe, when the greatest part are hardened, and yet the pods of the ripest are not burst, or but beginning to burst, and this is the true time for cutting them.

In whatever manner pease are sown, the best way of reaping them is by the hook: this should be fastened to a long handle, and the edge must be kept good. There is some trouble in managing them when they grow promiscuous, but when they are in regular rows, whether sown by the drill-plough, or planted by the instruments already named, the plants stand so regularly, that the reaping may be done with great expedition. This is of importance not only as to the sowing in the price of labour, but for the advantage of the crop: for when the pease are ripe enough to cut, the sooner that is done the better. The pea requires to lie some time upon the ground; but it should lie in heaps not spread. It is easy to gather them into these small heaps as they are reaped, and throw them up hollow, that the wind may blow in and dry them. If the heaps be carefully thrown up at first, they will need no turning, which is a great advantage, because pease are very apt to shed in moving. When they have lain there till thoroughly dry, they must be carry'd in, taking the greatest care to move them softly to prevent loss. If it happens to be wet weather when the pease lie out, they must not be turned, but suffered to remain

to dry again ; for their lying in heaps will save them from much damage. Little more than the surface will be wetted, and that will quickly dry. The best way of keeping them is out of doors in a stack ; for when they are housed they seldom preserve a good colour. In several parts of the kingdom they have now a method of sowing pease, beans, and oats, together in one field ; but the seed must be put in at different times, or it will not ripen together. The mixture being convenient in many cases, we shall give the best method of doing it. Plow up a barley stubble, and then scatter three bushels of common horse-beans by broad cast over the ground ; plow these in, and let the ground lie sixteen days : then sow the oats and pease, allowing also two bushels of each to the acre. Harrow these in ; and the same harrowing answers also for the beans. The oats will ripen at harvest-time, a little before the beans and pease, and this must be the mark of the season for cutting them ; for if the farmer stay'd for the ripening of the beans and pease, the oats would be shed ; whereas, if he cuts the whole when the oats are just safe from shedding, the beans and pease will ripen with lying, and the whole crop will yield an excellent food for the horses. They may be all thrash'd together ; and being afterwards mixt with the chaff, they go a great way, and are very wholesome for the feeding of the horses that do common work.

C H A P. XV.

Of Tares.

THE tare is a smaller kind of pulse than any of the pease, and will come in very serviceably to the farmer in a change of crops : it roots very slightly, and by its spreading stalks shelters and mellows the ground. The produce in seed bears a price ; and the quantity is very considerable.

A very indifferent soil will serve for the tare, and if it be ever so much exhausted by crops of corn, it will not only give a good produce from this plant, but will be getting strength all the time that it is growing. As the variety of crops gives great choice in this respect, it may be proper the farmer understand what soil does best for this ; since, tho' it will grow on any, the produce will be larger in proportion, as the land is more suited to it. A dry loam suits best of all with the tare, and the richer it be in mould, the larger will certainly be the produce. Lime-stone ground yields large crops, and gets great improvement by this plant : sandy soils will also do very well for them ; and they will yield a good produce even in the poorest of these. What is most unfavourable to the tare is damp and tough land ; therefore, it should never be sown on clays, nor in any ground that has a wet bottom. There are

other growths which these soils suit, and the husbandman will find great advantage in a proper choice of one or other of the smaller crops, according to these differences.

In any of the proper soils there requires no other preparation of the ground beside plowing in the stubble. Let this rot all the winter, and, in spring, the land will be fit for tares.

There are two kinds of tares, differing in little more than the colour of the seed ; that of one being white, and of the other blackish. They are called from this difference the black and the white tare ; and of the two the black is the hardiest. This should be chosen, found, heavy, clear, and of a glossy surface ; and it will be a great advantage to purchase it from some farmer at a distance ; and to get such as has grown on land of a different nature from that whereon it is now to be sown. The seed must be such as has grown the last season, and has been well ripen'd. If it be old, a great deal will fail, and yet more if it has been damag'd in keeping. About a bushel of seed should be allowed to an acre ; and if it be suspected to be faulty, there should be a peck more to make up for the bad grains. Nobody will think of being at the trouble of steeping the seeds of this plant, nor is it at all necessary, for it is as hardy as a common weed, and will shoot freely enough without this assistance. The latter end of February is the best time for sowing

sowing them, and there needs no more care than once plowing the land, and then harrowing them in. The quicker they are harrowed in, when they are once upon the ground, the better ; for they invite a great many devourers, and they are apt to get damage themselves, if they lie exposed to the dews.

Some sow tares and horse-beans together, as we have mentioned in regard to pease ; and they will grow very well in this way. Therefore, if there be for any particular reason, danger, that a bean crop should not succeed, it will be a good method to add these. They may be easily separated after thrashing, because of the difference of their size, a common riddle very well answering the purpose ; and as they ripen at the same time, there is no inconvenience in the practice : yet when the soil and other circumstances favour, I think they had better grow alone. When the seed is covered in the ground, nothing more is required of the farmer : it will take its growth without assistance, and occupy the land so thoroughly, as to suffer no weeds of any consequence to live among it. The time of cutting them, is when they are in general ripe, and have not begun to shed, and this is the way in which they do the ground most service ; but they may also be mowed at a younger growth for fodder. This must be directed by the farmer's particular situation ; but when food is wanted for cattle, it is often a thing of

importance; as the quantity is large, and the herb very wholesome and nourishing. The tares which were sown in February, will be fit to cut for fodder in May, and this may be repeated from time to time.

When the full grown crops have stood till the seed is of its due size, and begins to harden in the generality of the pods, they should be cut, and managed just as the pease in the article of drying. The best way is to throw them up in loose light heaps; and they will thus dry till they are fit to carry in without any turning: this is a needful care, because all the pulse kind are apt to shed, and lose a great deal in turning about. When they are dry enough to carry home, if the weather be good, that is, dry and hot, they may get the last hardening, by spreading on a floor, and several times turning of them; but if the season do not admit of this, they must be dried upon a kiln with a very moderate heat; for when they are put up damp, they always get musty and lose their power of growth, so as to be neither fit for food nor seed. The best way, when they are once properly dried, is to thrash them and put them up clean. They will be always in the way of accidents, if kept in the pods; but when put up clean in barrels or otherways, they will keep ever so long in a cool dry place.

C H A P. XVI.

Of Thetches.

THIS is another of the small pulse kinds, useful for improving the ground, and for fodder for cattle. The seed is of little value, except for the propagation of the plant again; and the produce in this respect is very small. Therefore the farmer is to consider it merely as an improver of the corn land, and a wholesome food for his cattle. The name **THETCH** is a mispronunciation of the right name of the plant, which is **CHICH**, it is the Cicer of the antients, one kind of which has of late become again in high repute, as a restorative, and promoter of venereal abilities. The plant grows to a size at least equal to the tare; and is so weak, that it lies almost entirely upon the ground. This is an advantage; for the more it covers, the more it mellows the land. There are two kinds of the thetch, which will differently answer the purposes of the farmer, one is larger and hardier, and will live thro' the winter. This is, therefore, called the winter thetch, the other is a smaller and somewhat tenderer plant, it is to be sown in spring, and is called the summer thetch. The winter thetch does most good to the ground, because it covers it the most perfectly, and for the longest time: and it is very early in spring ready for cattle, which is another article in its favour;

favour ; yet there are advantages also belonging to the summer thetch, which make it often highly useful.

Thetches will bear a damp soil, and for this reason they are valuable to the farmer, who may want to improve a wet piece of tillage ground with small pulse ; for the tare would not succeed in this sort of ground. The best soil for the thetch is a black mould, and it will thrive better after barley than any other grain. If a mellow soil has a dry bottom, tares will produce abundantly upon it ; but if there be a clay underneath that holds the damp, the proper small pulse is the thetch.

When a piece of ground of this quality has been impoverished by corn, the winter thetches should be sown upon it in October ; or the summer-kind in February. The land needs no more preparation than one plowing. If the winter thetch be sown in the beginning of October, it will be high above the ground early in spring ; and may either be mow'd, or eaten on the ground, which ever is judg'd most beneficial. The feeding on the ground has the advantage of improving the land by the dung of the animals, which feed upon it : but the mowing will make the crop last much longer. The summer thetch will be fit for mowing the first week in June ; or if there be occasion for it earlier, it may be eaten upon the ground in the beginning of May. When the ground on which the thetch is to be sown is tough and clayey,

clayey, the seed should be scatter'd on ridges and plowed in, and harrowed over afterwards : When it is a mellow earth, 'tis best to sow them in broad lands with a single plowing, and harrow in. This different method of is sowing should in some degree direct the manner of using the crop ; for when the thetch sown on ridges, as it will be difficult to mow, it should be eaten on the ground ; whereas, when it is sown on broad lands, and is therefore regular in the growth, and easy to be mowed, the best way by far is that ; because the produce of fodder is much larger as the crop is, and the land has the more benefit. The quantity, that cattle tread down and spoil, is often equal to what they really eat, and this is all sav'd by cutting it, and carrying it off the ground ; so that perhaps very fairly stating the account, the same quantity of ground will yield twice the food thus managed : there is however, some difference in the kind of cattle which are turned in. Horses are worst of all, because of the breadth and heaviness of their tread. The crop never comes to any thing after them. Oxen in wet weather are little less mischievous ; but when it is dry, they sometimes may be turn'd in without great damage : sheep and lambs have smaller feet, and they tread lighter, therefore the damage is less ; and in good weather they may be suffered to feed upon the ground without much damage, for their urine and dung will do good service to
the

the land, and the crop will grow up after their eating.

There is a peculiar consideration which regulates the quantity of seed of the thetch, which is, that the farmer does not raise it for the produce in pods, but to cover the ground by a multitude of stalks, therefore more seed may be allowed than in other cases: the thetch may rise thick, and it will be the more advantageous to the ground. Three bushels of seed is therefore as little as should be allowed to the acre. These crops will take care of themselves; but as here must be seed saved for exchange, and to keep up the crop, the driest and warmest part of the ground is fitter for ripening the seed, and a quantity of the plants on such a spot must be reserved for it. This should be considered at the time of sowing, and such a spot being selected, the seed should be sown there but in half the quantity, proportioned to the rest of the field. When the plants are come up, they should be cleaned and thinned in this part by hoeing, and if cattle are turned in to feed upon the ground, this spot must be fenced off from the rest. When the pods are ripe, the thetches are to be cut with pea-hooks, and thrown up in small heaps to dry; then they are to be carried in and spread upon a dry floor with a thorough air; and this will make them in a few days fit for thrashing. The seed after thrashing should be again spread on the floor, and, when hardened, put up for use.

The

The demand for it is not great, but there will be great use in exchanging it for seed equally good, which has grown upon a distant land, and that of as different a kind as possible. The management of the common crop is to be much the same with that of the artificial grasses; besides mowing for fresh food, and sometimes eating on the ground, a good part of it may be frequently made into hay with advantage; for it dries readily enough, and the hay is excellent. The cattle in general are fondest of the hay of the spring thatches, because it is tenderer in the stalk; but this may caution the farmer when he uses the winter thetch for hay, to cut it at a somewhat younger growth. The thetch will grow up again, either after eating or cutting, if it has not been ill treated; but it always rises better after the scythe than from feeding: therefore, if the farmer foresees he shall want some fine young food for his lambs at a certain period, he cannot do better than to mow his thatches, whether it be for a hay, or food at a convenient time before it. When the crop is off the ground, wheat or any other corn will thrive excellently upon it; or if the farmer chuses a turnep crop, there is no ground on which it will rise in greater perfection. Coleseed, which is another plant of the turnep kind, always succeeds peculiarly well after thatches. These are real and very considerable advantages, and we should remind the farmer of them, because they concur with
the

the nutritive quality of the thetch itself, to place it in some degree of esteem beyond what is usually paid to these small kinds. There is no wholesomer food for horses than the green thetch. Cows feed on it with pleasure, and it makes them yield a great deal of milk, and that excellent in its kind. The Ewes, while lambs follow them, thrive better upon the thetch field than almost on any other food ; and the lambs by their good condition shew, that it has the same effect on their dams, as on the cows, making them yield excellent milk in great quantities. If the spring thetches, which have been set aside for seed, do not ripen their pods in such good time as might be expected, the farmer need not be uneasy at it ; for they will cease growing on the decline of heat in autumn, and then the seed will ripen in a few days. The distance at which these plants are left, and the hoeing they have had, will make them grow in the stalk and leaf longer than the rest would do, but still there will be time enough for the ripening of the seeds, when the force of the root has done all it could in the encrease of the plant, and no more favourable weather promotes it.

There is one peculiar use farther of this small pulse, which must not be omitted : This is, the sowing it on a piece of one of the large artificial grasses, which have been broken up for wheat. The great rest of the ground, while these plants have grown upon it, has given opportunity

portunity to the breeding of many generations of worms; and sometimes a field of wheat, sown immediately after such a crop, has suffered extremely by these insects. When this is suspected, as may be known by opening the ground, it is an excellent method instead of wheat, to sow a crop of winter thatches upon this lay; and after these, pease and turnips, and then wheat. The succession of these crops come so quick, that all the four may be had in the compass of a year and half; and with good management, even a fifth may be obtained in the same time, and the crop of wheat the better for all the produce: for if the ground be plowed immediately after the forward turnips and pease, and turnip seed harrowed in immediately upon that, the turnips would have been serviceable in this case in winter, and in January the wheat be sown. This would be making a prodigious advantage of the ground, and the wheat would be better this way, as well as secure from the worms, which would be destroyed by these repeated tillages of the ground.

C H A P. XVII.

Of Lentills.

THE lentill is the least plant of all the pulse kinds which the farmer cultivates, and though less profitable in general than the

the thetch, yet there are cases in which it will be useful. Our farmers call the plant **TILL**, and the seeds **TILLS**, and in some places **DILL**. This was the occasion of a very unlucky mistake to a gentleman who kept some land in his hands in our neighbourhood; for writing to a correspondent in London for some of the seed under the name **DILL**, he received the seeds of the plant, whose tops are used in pickling of cucumbers; and not doubting their being right, he raised a crop of that useless herb upon his land. If more were written and read upon this subject, these mispronunciations might be avoided.

Lentills serve to mellow and improve land, and they are used as food for cattle; but though as nourishing as the thetches, they are not altogether so innocent. Horses have sometimes been thrown into disorders by them, when eaten fresh too freely; but they scarce can hurt any other kind of cattle, unless when made hay. The seed is more valuable than is known: hogs are fond of it, and it answers the purpose of feeding up, and hardening the fat better than any thing whatever.

In the choice of ground for the lentill, there is but one direction needful, which is, to allow it only such as is very poor: for the thetch is preferable upon all land that will bear it. That plant, however, requires some goodness in the soil, and when it will not succeed this will. The lentill will thrive upon the poorest loams,

loams, and even on sand, gravel, or chalk, will yield a tolerable produce, and vastly improve the ground.

The choice of the seed is a great article, indeed the greatest of all: for unless it be fresh and sound, very little is to be expected from it. Few of the seeds will grow when they have suffered by damps, as they commonly do in long keeping; and those, which do grow, will afford but poor and weak plants. All the pulse seeds are liable to get damage in keeping, but this more than the rest. The marks of its being good is, that it be sound, heavy, bright on the surface, and tough; dry, and free from any bad smell. The next care is to have it from a different and distant ground. The seed being thus chosen, the farmer may it raise various ways according to the circumstances of his land: for it may be sown either alone, or with the spring corn; or it may be raised either in the promiscuous way, or by the drill husbandry. As it does not cover the ground so well as the thetch, it is in that respect less valuable, but it is a much greater bearer. For these reasons, the culture should be different according to the use that is intended to be made of the crop: if for feeding, it should be sown alone, but if for seed, either with oats in the common way, or alone by the drill, to be managed according to the new husbandry: for as very poor land will bear this plant, and the seed, which may be this way produced in abundance,

is very valuable, and as all the time the same land would be preparing for corn, both by the crop and by the culture, this is a method which might excellently answer.

When the lentill is sown to cover the ground, and to be eaten or mowed for hay, or fresh fodder, the promiscuous way of sowing is best; and as the plant is small, and does not cover well, a great allowance of seed should be made. Four bushels to an acre will raise a larger quantity of fodder than any other proportion: and the roots are so slight, that they rob the ground of very little, while they mellow it considerably, though small, by this thick growth. In this way, they will rise with a new crop after mowing, and serve excellently for the large cattle first, and in this second crop for the sheep.

When the farmer has a mind to the seed, and does not chuse to trouble himself with the horse-hoeing husbandry for so slight an article, let him sow lentills with his oats in spring. In this case a bushel and half of lentill to the acre, is the best proportion I have seen. So many of the plants, as are raised by this sowing, will rather improve, than diminish the oat crops: for the little they take of the nourishment by their slight roots, they repay ten fold by shading and mellowing the soil about the oat roots. There is very little trouble, and no expence, in getting a quantity of lentill seed this way: for the two crops grow

grow together without mischief; and when the oat is ripe, the lentill also is ready for cutting. One reaping serves; as does also one drying, and they may be thrashed together: after this the two seeds may be separated only by throwing: for the oat being lightest will fly farthest; and the lentills will all drop by the way, and may be swept together.

When the little plant is raised by the horse-hoeing method, the produce is very great; and even worse ground will do for it this way than any other. The lentills should be sown in treble rows, with six inches between row and row, and three foot intervals between every three and three. This way about three pecks of the seed is enough for an acre. The best time of sowing them is the beginning of April, and they will require only two horse-hoeings. When they are an inch high, they should be slightly hand-hoed between the rows, and just on the outides of them: but the first horse-hoeing should not be till a fortnight after this: then the second should come just when the plants are beginning to pod: after this, the time of their ripening must be carefully watched. When the greater part are full grown, and none began to shed, they must be cut. A hook is the best instrument for that purpose. They should be thrown up in small heaps lightly as they are cut, and the wind will dry them enough for carrying. Then they are to be spread upon the floor of the barn, and as

soon as dry enough to thrash, that is to be done. The seed is then to be spread thin a few days, and is to lie to harden ; and after this, it is fit to be put up for use, either for feeding the hogs for sale, or for exchange : and though the present demand by way of sale is small, if it were more known it would be greater. The lentills, which are sown for fodder, should be principally dried into hay ; for in this way the horses and oxen are as fond of them as any other ; and they are not subject to be disordered by eating them, in ever so large a quantity dry. The different service, for which this hay is intended, occasions some difference also as to the time of cutting them. The oxen and cows relish the hay best, when it has been made of the stalk at full growth, but with the pods not yet gone to seed : but the lentill, when the seed is near ripe, makes the most nourishing hay for horses ; and they are as fond of it this way, as any other. It must not stand till the seed is hardened, because then the lower leaves will be decayed, and even the bottom part of the stalk be of little value : but while all is good, and the seeds are well grown, is the time for cutting it for this service. The lentills, when cut for oxen, will shoot very well from the root, and then a crop will feed sheep, which enrich the ground while they eat it : but this is not the case, when the full grown hay is cut for horses ; nor should any small crop be then expected, the lentill has
 done

done its office, and the ground is fit for the next growth.

C H A P. XVIII.

Of Hops.

WE have gone through the farmer's general concern in corn and pulse, and the natural and the artificial grasses: and it is proper that we now lead him to the knowledge of those articles, which are cultivated only in some particular places; though they are highly beneficial whenever they are raised, and may be easily introduced in more. Of these the hop demands first notice, being when rightly managed more profitable than almost any kind whatsoever.

We have said, these may be introduced in other places to advantage, besides those where they are already established. The farmer's first care, if he shall think of this, is to examine whether he has a proper piece of ground for the purpose. This is very material, for the hop is a tender plant, and easily damaged. There will be required for it not only a proper soil, but a good situation, shelter from the cold quarters, and a good enclosure to the others. This piece of ground, selected for hops, must be rich and deep in soil. No plant roots deeper than this, or requires more nourishment. A rich dusky mould, a fine black earth, or any

good loamy soil, are the only grounds wherein hops will grow well: nor will the best of these answer perfectly, unless there be also a proper bottom. Clay frequently lies under the soil, and perhaps the most common bottom next to that is gravel; but neither of these is by any means proper for a hop ground. The roots of this plant must be kept moist, but not wet; and the clay will hold too much water, and the gravel will let all through. Therefore these are both exceptions: the best bottom of all is a firm and pure loam, and this is very common where the soil above is loamy. If all these things suit, there must be depth of the good soil: if there be a full spade and an half depth, it will answer very well; less than this will not do, and if there be more the better.

There is a peculiar whitish land in Kent, which has a great deal of marle naturally among it, and nothing succeeds better in hops than this. As for the others, the nearer they come to the nature of garden mould the better. The situation should be such, as is defended from the north and north-east by trees, buildings, or hills; it should be open to the south east, and the more freely the air can play about it the better.

The spot being chosen, the next care must be to prepare the ground. The fatter the land is, the better the hops will grow. If the soil be equally good to the whole depth, very good plowing

plowing may answer the purpose of preparing it ; but as it commonly happens that the upper part is better than the lower, in this case it must be trenched by the spade ; and the worser part of the mould must be brought to the surface, where the weather will mellow and improve it ; while the first part, which before lay uppermost, is turned to a depth where the roots send their principal fibres. Great care must be taken, if on digging the ground it appears too wet. Drains must be cut which must be kept carefully clean and open afterwards ; and the soil in trenching must be thrown up in high ridges : it will by this means get rid of the abundant moisture, and will be the more improved by the air. There are several kinds of hops which are suited to various little differences in the soil, of which we shall speak ; but in whatever spot the hop ground is fixt, the care should be that the land is not rendered useless afterwards : and there is great danger of this if timely provision be not made by a right plantation. Hops will succeed very well upon the same piece of ground, twelve or thirteen years : but after this, a new spot should be chosen for that crop ; and if early care has not been taken, the old one will be nearly useless. Hops exhaust the ground so much in this long culture, that none of the common crops will thrive upon it, whatever care be taken : therefore the method is to provide by a plantation of useful trees. In

Kent where they have been long used to the culture of this plant, they make a double provision on this head ; and that so judiciously, that their hop grounds, while they yield a vast profit by the natural crop, are so many nurseries for their cherries and apples ; in both which kinds they are also famous. The method is this, when they first lay out their hop ground, they plant it with cherry and apple trees : these do little hurt to the ground, though they are excellently nourished by the culture given it for the hop. When the soil is exhausted by the hops, that is, at the end of ten, twelve, or fourteen years, according to the depth and management, the cherry-trees begin to bear, and the hops are removed to a new place. Cherries will bear very well a certain number of years, and in all that time the apple trees will be only coming to their greatest perfection : at the end of about five and twenty years, they grub up the cherry-trees ; and after they have had several years the benefit of the apples, the ground is fit for hops again, or for any other course of husbandry. This is a provision for our children : but we should remember, how glad we are that our fathers have provided so for us.

According to the nature of the soil, in those small differences we have named, the farmer is to fix upon one or other of the kinds of hops ; with these he is therefore to be severally well acquainted for this purpose. In the hop countries

tries they reckon four kinds ; the wild garlick hop, the square garlick, the long white hop, and the oval. The first of these is the wild hop of our hedges, the others have been raised from it by culture. They are vastly superior to it in the produce, and there are peculiar soils which they severally suit. The square garlick has a redness about the stalk which reduces the value, but it is a well flavoured hop : there is a long garlick which differs a little from this in the length of the fruit, but is usually redder than the square. The oval hop is an excellent kind, pale coloured, and of a good taste : but the long white is the best of all, it yields the finest crop of all, and in the greatest quantity. This is always to be preferred when the land will do for it : the wild hop is so much inferior to all the rest, that it should never be raised. The two others are to take their place according as the ground may suit them. If the soil be poorer than one would wish for a hop ground, the square garlick is the kind to plant ; for it is more of the nature of the wild hop than any of the others ; and a good crop of this, which may be obtained upon middling ground, is better than a poor crop of the others. In a middling soil the oval is to be raised for the same reason : but where the soil is perfectly good, no kind is to be thought of, except the long white. This is always the kind for a pure and deep mould. When the soil though deep and moderately good, has a tendency to be

be sandy, the best way is to plant a mixture of the long white and oval, for they thrive very well together in such ground: If on the other hand the soil is too tough, the long garlick must be the kind: therefore when the ground is chosen, and the sort or mixture of hop determined, the next care is to bespeak a proper quantity of sets to be ready for taking up at the time when the ground is got in order; and then to begin dressing the spot. The common practice is, to plant the hops in hills, at such distance that a breast plough can be conveniently used to dress the ground between them. But of all the plants raised by the husbandman, there is none that is so proper for the horse-hoing method, and if they be planted for this purpose, there will be a further advantage; which is, that being more distant than in the usual way, the air will have a free course among them, and they will by that means be preserved from most of those accidents which are said to render hops a precarious crop.

In the beginning of September let the ground be plowed up deep, or trenched, according to the nature and qualities of the soil; and after lying near a month in ridges, let the whole surface be laid smooth and level by good harrowing. They will break the small clods, and the ground, being quite plain and uniform, is then ready to be laid out for planting. The best distance for the hills is eight foot: therefore let a gard-
ner's

ner's line be drawn across the ground, at about a yard and a half from one of the edges; and let a person go over the ground along it with an eight foot rod, and a number of small sticks. At every eight foot he is to stick up one of the sticks, and when he has gone the length of the line, he is to move it eight foot into the ground, and plant sticks at every eight foot again.

When he has gone over the whole ground in this manner, the stick will shew where the hills are to stand; and unless the ground be naturally very rich indeed, it will be proper to improve it in those places by some manure. For this purpose mix together four loads of fine rich mould, from under the turff of a good pasture, one load of very fine old and well rotted dung, and half a load of coarse river sand. Turn these several times, and let the heap lie ready: then at every place marked by a stick, open a hole with a spade two foot deep, and two foot wide; throw out the natural mould, and fill it up with the compost: the quantity of which must be proportioned to the extent of the ground, according to the foregoing proportion of the several ingredients. The holes being thus filled, the foundation of the several hills is laid; and the next care is planting. The sets being bespoke, they are now to be taken up, the ground being got in this readiness by the middle of October. The strongest and healthiest sets are those to be chosen; and the best choice falls upon the highest hills

hills in the ground from whence they are to be taken. Those also are always best which come from the hills that have produced the greatest quantity.

When these hills are opened to take out the sets, care must be taken to get them out without injuring any part of them; and only the most perfect must be taken for the new ground; they should be ten inches long, and hearty in their growth, and they should have four joints. As many should be taken up as can be planted in the new ground the same day; or if they are to be carried to a distance, the whole may be taken up at once: but in this case they must be laid in the ground in a shady place, and only taken up as they are wanted by those who plant them. Six of these sets are to be planted in every hill, and for this purpose a hole of a spade deep, and above a foot broad, must be opened in the middle of each parcel of the compost where the sticks stood.

The six sets must be planted at equal distances, round the hole, laying them against the sides, and placing them so, that the tops may be just upon a level with the surface of the ground; then carefully pour in the mould that was thrown up in opening the hole, and fix it well with the hand about the several sets, keeping them upright, and well surrounded with this pure mould; then draw a covering of two inches of the fine mould over the tops of the sets. This finishes the hole, and gives the

the first rise of the hill in its place, which is thus about a finger's length higher than the surface of the ground.

If the sets are all got into the ground by the third week in October, they will be a good produce the first summer. Some plant the ground in spring, and then the plants are not strong enough to bear that year, so they lose the produce of one season. In planting the sets, if any one be injured by bruising, or any other way, it should be thrown away; the value is but small, and the mischief would be great. The injured parts grow mouldy as soon as they are planted in the ground, and they not only decay themselves, but infect the others.

The whole ground having been prepared by plowing, or trenching, nothing more will be needful, now the plantation is over, till the succeeding spring. The sets will grow freely with the rains of autumn; and the depth at which they are planted will sufficiently preserve them against frost.

The ground is to be thus left to itself all winter, but in spring it requires a thorough dressing, partly to destroy the weeds, and, partly, to give new nourishment to the crop. The common way is paring the surface with a spade, or with a breast plough; but it will be much better to do it by plowing up the intervals with the horse hoe. This should be done in the beginning of April, and all that is required,

quired, is to break the ground very thoroughly. The plants in the hills will grow with a great deal of vigour after this, and the poles for tying them should be fixed in the ground soon after, five poles should, in general, be allowed to each hill, and these for the first year should not be nearly so tall as those used afterwards; for the height of the pole encourages the hops to grow in length; and this should not be too much indulged the first year.

About four thousand poles will be required for every acre of hop ground; these, for the first year, should be about thirteen feet in length, and five inches and a half round; in the succeeding years, poles of five and twenty feet long, and seven inches and a half round, may be used.

The most commodious method is to lay down the poles among the hills, that they may be ready to stick up when they are wanted; they should be sharpened at the bottom, and always cut so, as to have a fork at the top, either a natural division of the growth, or one of the side branches may be cut, so as to answer this purpose. It is of essential service, for the hop lyes over the pole in the fork, and hangs down without pulling the rest from the pole. The short poles may be of alder; those for the succeeding year should be of ground ash, because they will be tough enough to escape breaking with the wind, which has great ef-

fect
cove
T
larly
of
are
equ
fixe
tha
exa
a v
sho
hil
eve
ver
wo
a d
litt
gro
ha
lea
th
th
fel
th
an
ov
w
ra
dr
pr

fect upon them at that height, with the thick covering of the hop.

The poles, lying ready, must be thrust regularly into the ground; when the young shoots of the hop are about four inches long, they are to be thrust firmly into the earth, at equal distances, round about each hill, and fixed so well, that they will sooner break than rise; they should stand nearly, but not exactly, upright, for the tops should turn a very little outwards; this throws the long shoot of the hop naturally off from the hill; whereas if the tops of the poles bent ever so little inward, the hills would be covered by so many arbours, and the plants would be subject to many diseases for want of a due course of air. When a pole bends a little outwards, the hops will be produced in great plenty and perfection, because the sun has free access to the plants; but too much leaning will subject them to fall; neither if they keep up, will they bear so well. When the poles are all up, the hops will, of themselves, in most cases, lean to them, but in this they must soon after be assisted.

When the shoots have got to be two feet and a half high, the poles should be looked over, to see they are all firm, and stand right; where any thing is amiss, the use of a heavy rammer, forcing the earth about them, will drive them a little any way that shall be thought proper, and they will afterwards keep their posi-

position. At the same time that this is done, the plants may be led to the poles and tied; the stalk of the hop must be wound twice round the pole, according to the motion of the sun. This is an essential article, for the growth will otherwise be greatly disturbed. If we regard the wild hop in its climbing, we shall always see the round is made that way; and as it is the natural effect of the heat forcing the growth principally to that part, it would be very absurd to put nature out of her course. When the hop is properly led round the pole, it must be kept in the place, by tying once near the ground, and once a little higher; any thing that is soft will serve for tying them, but the properest thing of all is coarse yarn, because that is tender, and capable of giving way. The hops must not be pressed against the poles, only drawn towards them. If the stalks are brittle, as they are apt to be in rich ground, they must be tied about three o'clock in the afternoon, or from three to five, for at that time of the day the stems are tougher than at any other.

From this time the hops will grow very fast, and will wind themselves round the rest of the poles, so that there needs no more trouble. Toward the middle of April they will be seven or eight feet high; and as some may now grow amiss, they must be put right with a

forked

forked stick, they will easily take the proper turn again, and after that time grow to the poles as well as at first.

Towards the latter end of May the hops will be got up as high as the tops of these poles ; and once more a labourer should look to those which do not grow kindly ; laying the main stem over the fork of the pole. He must take a step ladder for this purpose, and this is the last care ; for afterwards they will do perfectly well of themselves. The time now is come for a second horse-hoing : and as no more trouble is needful for the plants, there is natural leisure to do it. If the ground had been broke sooner, the growth of the hop, in stalk, would have been promoted by it, which is by no means proper at that season, we see the plants growing very fast without any such assistance ; and what we are to fear is, the carrying them up too high, because the produce in fruit will be the less for it.

Toward the end of May, the plants, being got over the tops of the poles, have no more that inducement to rise ; and therefore what we give in nourishment by horse-hoing, goes toward the forming of the fruit, the first buds towards which are now made, though not yet visible. In the common management of a hop ground, the beginning of June is the time when they pare the surface to destroy the weeds and raise the hills : they take it off about an inch and half deep, in all the space between

R

hill

hill and hill, and throw it up to the hills to raise them. This is a very imperfect method of dressing the ground. The horse-hoe answers the purpose vastly better : the making the hills up is still easier after the soil is thus broken, and the earth which has been mouldered to pieces, by that instrument, gives much more strength to the plants, than the hard surface just pared away for that purpose.

Whichever of these methods the planter chuses, he should first clean the hills, pulling up all weeds, and taking off the straggling shoots of the hops themselves, which only exhaust the root, and are useless. After this the earth, turned up by the horse-hoe, should be broke finer on the surface with the back of a spade, and then as much as is needful should be thrown in upon the hills ; between, and all about the shoots of the hop plants. The hills should be raised about four inches this time, and they should spread proportionally at the bottom.

Toward the end of June they should be raised once again, by paring off some of the best of the mould in the intervals, and throwing it over them : and when the hops begin to fill in July, the ground should be once more horse-hoed, and the hills made up again. If the horse-hough is not used, the surface must be pared by hand, and the hills raised at the same seasons.

The first of these horse-hoings, or parings, which

which will be in the beginning of June, will give the plants new vigour, and when this has very well filled, the stem and vegetation are strong in it; after a little more growth, it must be turned to the branching of the plants, by stopping their perpendicular growth. The latter end of June is the right time for this, and it will be best effected by taking off the leading buds at the extremity of each plant. A careful person should be sent into the ground for this purpose, with a step ladder, and this being set up against every hill the plants are to be thus managed. Such, as begin to branch, need not have the top taken off, but it should be turned away from the pole, after which the stem will not encrease in length, but the tendency to branching will encrease. In all the others which grow in length, and have no branches, the top of the plant must be pinched off with the finger and thumb; and, after that, there will be no more growth in length, but all the force of nature will be sent to the branches, which will begin to form themselves in a very few days, from this stopping the growth in length.

In common seasons, this is all that is required; but sometimes, in wet years, and very rich grounds, these very branches will grow luxuriant in length; and the plant, extending itself in bigness, will bear little fruit, if this be not prevented. The same method answers the purpose perfectly.

When these branches grow too long, their ends must be pinched off: the whole plant will then be covered with buds for fruit. We see this effect of taking off the luxuriant shoots in gardening, in a thousand instances. Beans never bear so well, as when their heads are pinched off: and it will be found useful in many other cases. The hop ground is a garden of a particular kind, but all the garden rules hold good in it. After the pinching off the tops of the plants, the buds soon swell, and nature ripens them. The last horse-hoeing is of prodigious service in this respect; and hops, so raised, will exceed any that can be obtained by the common methods. The inferior kinds, with this management, will be equal to the best, when they are less carefully raised: and the poorest grounds will receive most advantage by it, which is a very happy incident. When the planter uses the horse-hoeing method, he should watch his time in the driest weather for performing it, because the plough takes most effect, and works easiest at those seasons; but when he is content with the old method of paring off by hand, the most favourable time is just after rain, because the earth will not cut easily with the spade, or breast-plough, at any other seasons.

There are many advantages in the horse-hoeing method, but one of the greatest is keeping the plants in health. Half the mischief, that happens in the hop grounds, is

owing to the want of a due supply of nourishment.

In this management the plants will flower in the latter end of July, and by the second week in August the hops will form themselves like little hills. In the common way, both these operations of nature will be a little later. Three weeks, from their beginning to bell, is required for ripening them; and if the weather proves cold, or rainy, it will be somewhat longer: therefore from the end of August, to the middle of September, is the natural season for gathering of hops. The hop, till ripe, is green, moist, and destitute of smell. When it begins to ripen, it grows dry, paler coloured, and fragrant. This is seen at a distance, but a more certain proof is obtained by examining the seeds: these are at first green and soft, but, as they ripen, they grow harder and brown. This is the perfect maturity of the hop, after which it soon loses its fragrance, and falls to pieces, if left upon the plant. The time of gathering the hops, is when they grow pale and dry, when they smell fragrant, and the seed seems just turned brown. They are then perfect, and they must be pulled immediately, for after this they spoil every moment. The more hands there are in a hop ground at this season, the better. The way is to cut off the plants a yard above the ground, and then to clear them at the top, by cutting the stalks with a sharp hook upon a long pole,

wherever they are entangled one with another. Thus every pole will be covered with its own plant, and free of all the rest; and it may then be pulled dry, and laid upon the ground for picking. The best management is to divide the hands into three or four parcels, and to make them begin in so many distant parts of the ground. Four hills should be cut up first of all, in each of these places, and a floor be prepared in the place where they stood, by levelling the ground, and beating and rolling it: this serves very well for the people to work upon; and the first hops they are to pick, should be those which grew upon the hills that were cut down for that purpose. After this, the ground is to be cleared, by degrees, in the same manner, carrying the plants, with their poles, to that floor which is nearest the place.

The safest way is to cut them down as fast as they can be picked, and no faster; for hops very easily get damage while they are upon the plant after it is cut. The best way of taking up the poles, is by a lever and block; the lever being split at one end, in the manner of a pair of tongs, and that part lined and toothed with iron. The pole must be rocked about by the hand first, and then, the block being laid near it, the split end of the lever is to lay hold, and it will be torn up easily, by bearing the lever down over the log.

The plants are not to be unwound, but carried, poles and all, to the next floor of picking.

picking, and the hops must be picked carefully and cleanly; none of them broken, nor any stalks left to them. The buyers of hops are very nice; and cleanliness and care make up a great article in their value. When the hop is full ripe, it loses the least in drying; but when gathered a little before that time, it has most virtue.

As the fine colour and fragrance of hops are their great recommendation, there must be the utmost care taken to dry them quick; for this is the only way to preserve both those characters. The quicker they are picked, the less damage they get upon the stalks; and after this they are to be carried directly to the kiln, where they are dried. The great management is to proportion the several parts of the work one to another, to cut down the plants as fast as they can be picked, and to pick them as fast as they can be dried.

If they are picked too fast for the drying, they must be spread thin upon a floor where there is a thorough air, and turned now and then till there is room for them upon the kiln. A common malt kiln, with a hair cloth for the hops, is the usual method of drying, and succeeds very well; but there is a method practised, in some places, of a kiln with a tin floor, and a kind of moveable roof, which answers much better, because the roof, reflecting the heat, dries the upper part of the hops, while the immediate heat of the floor dries

the other ; and thus the work is done without turning the hops, which is necessary in the other method, and which always does them more or less damage by breaking, and wasting the seeds.

In Flanders they dry hops upon a kind of floor of rails, with small spaces between, under which is a smooth floor, with a fire placed in the center : charcoal is the best fuel, but in some places they burn wood, and the hops get a peculiar flavour by it. The hops may be six inches thick upon this kind of kiln, and they must be moved a little, where they dry slowest, that all may be alike. What seeds and broken pieces of hops fall through these rails must be swept up together, and put to the rest of the hops ; but it is a much more delicate method to avoid breaking them, or spilling the seeds at all, which may be contrived by the kind of kiln before-mentioned, with a cover to let down, or hold up, as occasion may require. The bed of tin may be laid upon a kind of lattice-work, of wood, and upon this the hops may be laid seven inches thick, and they will dry very thoroughly ; and one of the sides being made to fall down at pleasure, by means of hinges ; when the hops are dried, they may be thrust off from that part, without any danger of breaking, as there will be in any other way, because they are moved to take them out, while brittle, from the drying. This is the

time

time when they are most of all capable of injuries, because the heat is yet in them : they afterwards grow somewhat tough again in cooling. When they are taken from the kiln, they must lie in an airy room to grow gradually cold, and then to toughen ; and then they may be put into bags, and pressed ever so hard, without breaking. It will require three weeks, or longer, to give them this preparation. If they cool too fast, there must be a blanket spread over them, and the same caution should be used at times afterwards, to assist the toughening of them, if the weather be very dry. When they are ready for packing up, a hole is opened in the floor of the room, which goes through the ceiling. The measure of this should be four feet by three, and a hoop is to be prepared, that will not go through it, and that has a great deal of strength. The bag into which the hops are to be packed, is to be fastened to this hoop at its top, turning the edge all the way over the hoop, and sewing it strongly down with a packing needle ; then the bag is to be put through the hole, the hoop keeping it from falling into the lower room. A few hops are to be thrown in, and tied up in bundles at the corners, which will serve afterwards to handle, and manage the bags ; and when this is done, the rest are to be thrown in by small parcels at a time ; a person gets into the bag to lay them well, and not only lays them even, but treads them
down,

down, all which violence they will now very well bear. When the bag is full, the hoop is taken away, and it is sown up at the top, leaving there also a couple of cushions at the corners, and thus the hops are ready for the market.

The ground requires no care all winter; the roots lie deep enough to be very safe from injury by frost, or accidents, and they will be strengthening themselves for the next season. It is in the spring dressing of the hop-ground, that the planter will begin to perceive the advantage of the horse-hoeing husbandry; for if this method be followed, there will be no need of manure; but if he has managed the ground in the common way, and it has had no farther advantage than the paring away the surface, and making up the hills, there will be a necessity of a large quantity of manure, this is composed in the same manner as the compost for setting the roots, only with a double proportion of the dung, which must be very old, and well rotted, or else it will destroy the crop. This manure should be mixed up the autumn before, that it may lie to mellow together; and, in spring, the surface of the hop-ground is to be turned up with a common plough. The old straw of the last year's hops should be burnt upon the ground in several heaps, covered with a little of the mould; and this calcined earth and ashes, together with the manure before directed, is to make
up

up the hills for the next season. The beginning of April is the best time for this work; for the hop shoots late, and the greatest benefit will be obtained by dressing the hills a very little before the rising of the buds.

The dressing of the hills must be done thus: The earth of the hill is to be drawn off, that the roots of the several plants may be seen; the old, or original roots, which will at this time look of a fresh and glowing ruddy hue; these are to remain untouched, but the new roots, which are white, are, in general, to be cut away; but if any of them run downwards, those are to be left on.

The roots being thus dressed, the shoots are to be managed much in the same manner. All the old, or original shoots, are to be left on; and if there be any new ones that rise well, they are also to be left; but the generality of the new shoots are ill placed, and are to be taken off: this being the first dressing of the hills, the shoots must be cut off a finger's breadth from the old ones; but in the following years they may be cut away close.

If any of the plants have the first summer yielded a bad hop, which is often the case; they should be marked at the time, by thrusting a stick down by them; and in this spring dressing, these plants should be taken entirely away, and some of the new shoots, from the other hills, set in their place.

When

When the roots and shoots are trim'd, the hills are to be made up with the manure, and the earth taken from them is to be spread in the intervals.

In the horse-hoing method, all this trouble of new manure may be spared, for the whole earth of the intervals will be enriched by the frequent turnings, and will itself serve as compost for the hills. In this method I should advise, that the middle of the intervals, throughout the whole ground, should be plowed up with the horse-hough, and thrown up high.

In this way it should lie all the winter, and the top of the ridges would then be mellowed by spring, into a much better manure than any that could be procured from dung: for dung always hurts the hop, when not sufficiently rotted; and, at the best, is not equal to such a natural manure as the proper soil, mellowed, and enriched by the dews, frosts, snows, and thaws, of a whole winter.

In this case, the hills should be taken down in April, and the roots and shoots dressed exactly as in the foregoing directions; and then the tops of the ridges should be pared off with a spade, and shook carefully over the roots; and finally, wrought up into the hills.

In this manner, the second year's produce will greatly exceed the first; and the third that of the second: and from that time the plants will continue in strength and vigour nine or

ten

ten years, if the ground be carefully dressed for them: but if, at any other time, neglect has occasioned the plants to decline, the remedy must be applying manure, such as described before, if the ground has been cultivated the common way; but if, by the horse-hoeing husbandry, there will need little more than plowing. If any manure be given in the course of this method, it should be in the winter; between the third and fourth season, and, again, in that between the eighth and ninth; and at these times a very small quantity will be sufficient.

When a hop-ground, that is cultivated in the usual way, appears decaying, the same roots will immediately grow strong, and flourish, if planted in a new piece of land; and the horse-hoeing husbandry can give them the same advantages while they stand in their original ground. In the common way of management, the roots extend themselves little farther than the substance of the hills, because the ground of the intervals is too hard for their fibres to penetrate; but, in the horse-hoeing method, the whole ground is kept in a state of culture to a considerable depth, and the roots, instead of being confined to the hills for their nourishment, send fibres through the whole intervals; every horse-hoeing breaks off a multitude of these, and from every broken part arise numbers of others, so that the plants are, from
time

time to time, furnished, not only with fresh nourishment from the new broken soil, but even with new mouths by which to receive it.

Another vast advantage of the horse-hoeing method is, that it always keeps the earth moist about the roots of the hops; for it is confirmed by all experience, that fresh broken ground receives and detains the dews vastly more than such as is hard. In dry spring seasons, the planters are obliged to water the hop-grounds, and the extent of their plantations; and the great quantity of water, required for every hill, render this a work of great expence: there never is any necessity for it in a hop-ground managed by the horse-hoeing method; the seasons when drought is thus prejudicial to the hops, is one of the times of the natural hoeings, and this never fails to supply nourishment, as well as moisture; it feeds the shoot, as well as sets it to growing. There are summers so dry, sometimes, that two more waterings shall be necessary, one when the plants have obtained two thirds of their height, and the other, just as they are preparing for flower and fruiting; these also are two natural periods of the grounds being horse-hoed, and thus in that excellent method the whole goes on regularly, and even the most unfavourable seasons lose the evil effect.

If, on any account, one would wish the planter to add to the usual expence of the ground,

ground, it should be to raise a large and coarse shed, which would serve for picking the hops in safety at the season, and in winter would preserve the poles: this might be open on one side, and therefore consisting only of two ends, a back, and a roof; and might be built coarsely, yet strongly, for a very moderate expence. The poles cast a great deal, and are easily damaged in winter, whether they are laid along, or piled up end-ways; they give a great deal of trouble when they break, and there is a constant charge in new supplying the decayed ones; this would be all saved, by keeping them under cover, and a great deal of the expence of the shed would, in the course of time, be saved in this single article. The planters very well know what damage the hops get by showers of rain, or by a searching sun, while they lie for picking; and all this would be saved by doing it under this light cover: nor would there be that trouble and confusion which always attend the picking of hops in high winds. It is said, that in plantations where the hills are set at twelve or fourteen feet distance, the produce is as much from an acre, as where they stand closer, because, in this case, the plants bear fruit all the way down; but at the distance here directed, the air has a free course, and the sun full power, and more than this cannot be necessary.

If the account given by Mr. Lisle, from the Winchester hop-merchant, be exact, it may be

be a rule for placing the hills somewhat more distant than here is ordered ; but when he talks of double, he certainly means in respect of those old plantations, where the hills were raised very close, and the ground for that reason subject to frequent disorders. It should seem, that as the hop requires a moist earth about its roots, this very distant plantation exposing the surface too much, would hurt the crop in that respect ; in all things, moderation is the rule of wisdom, and, in the present instance, it should appear, that such a distance between the hills, as is here directed, will answer the purpose of giving free passage to the air and sun, which is all that can be proposed on that head, when we consider spaces of this extent, and yet will not expose the surface of the ground too much to the sun.

In the drying of hops, care should be taken not to let them lye too long in the heat ; for they will evaporate for some time after they are removed, from the heat that is still left in them ; and if this be not allowed for in the kiln, they will be too dry. The fault of this is, that they never will acquire afterward that soft, damp, and mellow condition, which is perceived by the hand in holding them, and is one of the great marks by which the buyers judge them. There is a certain spirit in the hop, beside its bitterness, which it communicates to the beer, and this is lost in too much drying. When this is gone, the hop has much
less

less value ; and custom has taught them to judge of this by the softness and dampness of the hop ; probably it never deceives them ; but, however that be, the planter will always find them depend a great deal upon this condition in the hop, and their rule of judging is, by the seed : therefore the planter must be very careful not to loose this in moving the hop in drying, nor to let them be gathered before they are of a due degree of maturity.

C H A P. XIX.

Of Flax.

A Few parts of the kingdom only at present supply the markets with flax ; and 'tis most owing to that, that so much of the linen manufacture is imported, and at so large a price. Where-ever there is good ground, for the plant requires that, it may be raised easily : and whoever shall engage in this, will do high service both to himself and his country. Ireland has shewn the way ; and 'tis in our power to follow the example in many places. There are three kinds of soil on which flax will grow ; these are, fine rich black mould, like garden ground, which is the best of all ; then the rich and light hazely earth, which differs from the former principally in the having more sand ; for the colour is of no consequence : the third soil, is the tough,
S clayey

clayey loams, which are always somewhat moist. These three soils have different effects upon the crops, but all may be useful. The general, or, as it may be called, universal soil for flax, is the fine black mould first named, enriched with rotten dung: this is the sort of land on which they raise it about the edges of the fens in Lincolnshire; and this always yields a strong, well-bodied, and tolerably fine flax. The light soil yields an extremely fine flax, but in small quantity: the moist loam affords the coarsest stalk, but it is the finest of all for ripening the seed. This is singular in the nature of the plant, because, in general, dry and light soils answer that purpose best; but there is no disputing facts, and experience shews, that the best flax seed, both abroad and here, is such as ripens on these loamy lands. In general, some moisture is required about the roots; and as in wet seasons the flax succeeds best, in the same manner that black mould, on which we find it thrive so greatly in the fen countries, has some wet at bottom, and these loams a great deal.

Though light soils will raise flax, they are the least valuable of the three: therefore the farmer should be advised to chuse for it one of the two others. Flax does not succeed so well in open fields as in enclosures, for it is subject to accidents from cold winds, hail, and drought: the shelter of enclosures is some defence against all these. The best situation

is on flat ground, because such is less exposed, and is naturally richer and moister than what lies high. The black mould soil should always be, as indeed it commonly is, in such a situation; but the tough loam may lie on a small ascent, because it will always retain moisture; and keep the roots firm. Therefore, if the farmer has a rich low field of six or eight acres, sheltered from the north-east, and in good heart, he cannot do better than raise flax upon it: this should be the first business, afterwards he may sow it on loams in smaller rising enclosures for seed.

The ground being chosen, the preparation is our next care: if barley has been the last crop, nothing can be better; because flax requires the land to be in very fine tilth; and the preparation for the wheat, which has naturally preceded the barley, and that for the barley itself, have reduced it to this fine condition. Manure should be added, and the land again well prepared for the flax seed. There will be time for this, as the flax is not to be sown till spring: the dung that is used must be very old and well rotted, and there should be mixed with it equal quantities of pure river mud. Marle is another excellent manure for flax seed, enriching it for a continuance of time, and having this advantage even over dung, that it does not subject the ground to weeds. Lime is another good manure on this occasion. A considerable quantity of one

or other of these dressings will be required for land that has been exhausted by corn: but, on the contrary, if a piece of natural pasture be broke up for it, there will be required a great deal of tillage. The fresh land will answer best of all, if sufficient labour be employed upon it, but otherwise the crop often miscarries. When fresh land is broke up for flax, it should have a whole year's preparation; but for land already in tillage, the winter between harvest and the flax seed time, which is in April, will be very sufficient.

Grass Land should be broke up in Spring, and it will require four good plowings between that time and the following spring, for sowing: the deeper the land is plowed, and the finer it is broke, the better this crop will always succeed. There is no expence of this kind the farmer can put himself to, that the crop will not return many fold.

The best flax seed is to be had from the province of Zealand: there is very good from the Baltick, but this is preferable. After a time, the farmer may raise it for himself; but the first crops should be raised from foreign seed, and none is so good as this. Let the farmer be sure he has it from the right place, and then take care that it is in a state of perfection. It must be large, heavy, very smooth, and the thicker it is, the better. This Zealand seed is raised on stiff clayey soils; and the

the Dutch, so famous for their Hollands, use no other.

They carry on a trade with flax seed, which they import from Riga, and with it supply other nations ; but they never sow themselves any but what they raise at home.

The farmer may take his choice of three manners of sowing. Very good crops of flax have been, and are raised in England, by the common old way of broad-cast sowing ; but the planting it by the drill method, is certainly better, because it gives free room for weeding ; and, possibly, the allowing broad intervals for the horse-hoeing husbandry, may be the best of all. They speak of great advantages in France from this method ; and reason thus far countenances it, that flax requires a great deal of nourishment ; and no kind of husbandry can give a crop so much. There may also be another advantage, in this method, worthy consideration, which is, the keeping the ground in heart : for whatever way flax is sown, it is found to exhaust the ground so, that it is in very ill condition for a following crop. This method is certainly calculated for keeping one part of the land in heart, while the other is exhausted ; for the middle of these intervals enjoy a kind of fallow, even while the flax is growing.

It is said by those who have raised flax in this new method, that not only the quantity is larger, but the thread is stronger than from

any other: the first of these assertions I should be inclined to doubt; but the other is very probable, and it would be a sufficient recommendation of that method. Whatever can improve the crop, should be attended to here, with diligence, since it is certain, more flax might be raised, than now is, with great benefit to the nation.

The Dutch prepare their flax grounds by planting madder, which requires great culture, and therefore leaves the land in excellent condition. If our present attempts to introduce the culture of that plant in England should succeed, we may be happy enough to follow their course with a great deal of exactness; but, if otherwise, or, till that shall be accomplished, the farmer may make the same use of some other crops, as they do of this.

The Dutch, when they have taken a crop of corn off of their ground, which has been very well prepared for it, plant madder the next year, and after this sow flax. The madder being two years in the ground keeps it in good condition, and clear from weeds, which is a great article in the raising of flax. Our farmer may make the same use of pease and turnips, as the Dutch do of madder, and by their assistance after corn, he may raise flax to great profit.

If he chuses the old method by broad-cast sowing, he must take care to get the ground in a perfectly fine condition. When the land

is

is plowed up for winter, it should be thrown up in high sharp ridges, to prevent the rains from soaking into it; and then, in spring, it must be laid as flat as possible, and perfectly prepared by the beginning of April, which is the time of sowing; or if the spring should be particularly fine, it may be done in the latter end of March. The quantity of seed for this manner of sowing must be three bushels to the acre, and a great deal of care must be taken to spread it even.

The best way is to go twice over the land, strewing the seed with the right hand going one way, and with the left in coming back; the ground must be clean and level, for this, and then a good and careful harrowing will cover it: the best way is to use two fine harrows, joined together, and once going over the ground, with these, answers the purpose.

When the flax is three inches high, it must be carefully weeded; for the crop will come to nothing if it be not kept clean. A great deal of caution must be used in weeding, for if the flax be trodden down, it rarely recovers.

In Ireland they make the women weed sitting, and find that answer better.

In England, some have ventured to turn in sheep, when the flax was five inches high, and sometimes it has succeeded: but these methods are both so hazardous, and the absolute necessity of weeding is so great, that it is vastly the better method to sow the seed in

drills, whether the intervals be left for horse-hoeing, or only for the paths of hand weeders.

The drill plough will be the best instrument for this regular distribution of the seed ; and if intended for hand-hoeing, it should be sown in double rows, seven inches asunder, with an interval of twelve inches between pair and pair, which will answer for the more careful people, employed to hoe them. The weeding is to be done by the hand-hoe, and it must be repeated a second time. The first hoeing should be when the plants are three inches high ; and the second when they are near their full growth. A dry season must be chosen for hoeing, because the weeds that are cut up would otherwise take root again ; and not only the weeds are to be destroyed, but the flax plants should be left at a foot distance, and alternate in the rows, not strait over-against one another.

The flax will ripen in July, or the beginning of August, and it must be pulled as soon as it is ripe, otherwise it will be extremely damaged ; those who intend to save seeds of flax from their ground, must mark out a particular part of the crop for that purpose ; for if the whole should stand till the seed were ripe, it would lose the greater part of its value. To know the exact time of pulling flax, the farmer must watch the heads ; when the seeds fill, they grow heavy, and the sun soon makes them brown ; their weight bends down the tender twigs on which they stand ; and, as

soon

soon as this begins to happen, the flax should be gathered. When they droop ever so little, and begin to change colour, the stalk is full ripe; after this few juices are sucked up, and the thread withers.

If the crop be gathered before this change begins, the thread will be white, but weak; and after it first appears, every hour is a loss. The mark of the true time is plain enough, and the farmer must take care to seize upon it.

Whether the flax be sown in drills, with the small intervals for the hand hoe, or by the common broad-cast method, the same course is to be taken in the curing of it: when it is seen to be ripe by these marks, people are to be sent in to gather it; which is done by pulling it up by the roots. It comes up very easily, and should be laid in little heaps, as it is pulled; these should be a foot and a half high, and the heads always turned to the south. It will take between a fortnight and three weeks lying on the ground, before it is ready to carry in.

The flax is not a very juicy plant, but great care must be taken that it dries regularly, for if it be too long damp, the thread will be rotten; and if it be dried too hastily, it will be harsh.

When it is properly dried, it must be carried in, and if not sold in this condition, it must be laid up under cover till the farmer has time

time to work it, as far as he intends, but the sooner this is done the better.

If the season be unfavourable for the drying of the flax on the ground, it should be gathered into little bundles, and tied. The way is to tie it as near the heads as can be, and the stalks are to be spread out, and set to the ground; this gives the air and sun a more full power over them, and is therefore best in such seasons as will not let them dry, lying on the ground; but in the fair weather we commonly have at that season, the lying on the ground will usually answer the purpose; and the Dutch, who may very well be our masters in this article, prefer it to any other way whatever.

It remains, that we give the method of raising the flax by the horse-hoeing husbandry. To this purpose, the ground should have all the advantages allowed for the preparation of it for this crop with other methods. Then let the seed be sown by the drill, in double rows, with a foot distance between row and row, and broad intervals to admit the horse-hoe between pair and pair: when the plants are four inches high, the spaces between the rows must be hand-hoed, and the outsidcs of the rows should be cleared by the same instrument.

A fortnight after this, the broad intervals should be horse-hoed, and this must be repeated twice; during the time the crop is on the ground; once, when it is half grown, and the other time when it is near the full height,

height. After this the pulling and curing must be the same as in the usual method of culture; and flax may be again sown upon the same ground the next season, taking that part which was before the middle of the large interval. This should be plowed to a great depth for that purpose, and reduced very fine; and the second year's produce will probably be a great deal larger than the first. By whichever of these ways the farmer raises flax, the best method of disposing of it will be as soon as it is cured upon the ground. This is the proper end of his concern; and having disposed of his crop, he will be at leisure to prepare his ground for another: but as there may not be always a purchaser for it in that state, we shall lay before him the method of working it, so far as it need, in any case, become his concern. When the flax is pulled for seed, as well as thread, that must be separated before the stalks are put to the water, but in the way here directed for saving a particular piece of the ground for seed, the management of the common crop is much the easier. This is to be carried at once to the water; because as the seed is not regarded, there needs no delay to separate it. The intent of watering the flax is to make the bark separate the more easily from the woody part of the stalk, and the fresher it is from the field, the better this will succeed. The warmth of the season also assists, for warm water takes much more effect on vegetables, than cold.

The

time to work it, as far as he intends, but the sooner this is done the better.

If the season be unfavourable for the drying of the flax on the ground, it should be gathered into little bundles, and tied. The way is to tie it as near the heads as can be, and the stalks are to be spread out, and set to the ground; this gives the air and sun a more full power over them, and is therefore best in such seasons as will not let them dry, lying on the ground; but in the fair weather we commonly have at that season, the lying on the ground will usually answer the purpose; and the Dutch, who may very well be our masters in this article, prefer it to any other way whatever.

It remains, that we give the method of raising the flax by the horse-hoeing husbandry. To this purpose, the ground should have all the advantages allowed for the preparation of it for this crop with other methods. Then let the seed be sown by the drill, in double rows, with a foot distance between row and row, and broad intervals to admit the horse-hoe between pair and pair: when the plants are four inches high, the spaces between the rows must be hand-hoed, and the outfides of the rows should be cleared by the same instrument.

A fortnight after this, the broad intervals should be horse-hoed, and this must be repeated twice; during the time the crop is on the ground; once, when it is half grown, and the other time when it is near the full height,

height. After this the pulling and curing must be the same as in the usual method of culture; and flax may be again sown upon the same ground the next season, taking that part which was before the middle of the large interval. This should be plowed to a great depth for that purpose, and reduced very fine; and the second year's produce will probably be a great deal larger than the first. By whichever of these ways the farmer raises flax, the best method of disposing of it will be as soon as it is cured upon the ground. This is the proper end of his concern; and having disposed of his crop, he will be at leisure to prepare his ground for another: but as there may not be always a purchaser for it in that state, we shall lay before him the method of working it, so far as it need, in any case, become his concern. When the flax is pulled for seed, as well as thread, that must be separated before the stalks are put to the water, but in the way here directed for saving a particular piece of the ground for seed, the management of the common crop is much the easier. This is to be carried at once to the water; because as the seed is not regarded, there needs no delay to separate it. The intent of watering the flax is to make the bark separate the more easily from the woody part of the stalk, and the fresher it is from the field, the better this will succeed. The warmth of the season also assists, for warm water takes much more effect on vegetables, than cold.

The

The fittest water for this purpose is that of a large shallow pond ; the flax must be laid in the water in bundles, and kept under by a small weight. Once in two days it must be turned ; and, after a week's lying, the stalks must be tried whether the bark be loose ; if it is, the bundles must be taken out ; if not, they must lie a day or two longer : six, seven, or eighth days usually answer the purpose, according to the softness of the water, and heat of the season.

When the bundles are taken out of the water, they must be spread to dry. This will take ten or twelve days, and the flax should be turned every day ; when dry, it is to be cracked all to pieces with an instrument called the Brake ; this splits the stalk, and makes it all hang in tatters. The method is to begin at the lower end of the stalks, and brake them all the way up. In great concerns they have an oven for drying the flax, after it has been as well hardened as it could upon the ground ; and this makes the work the easier. After breaking, the flax is to be beaten with an edged stick, which is called swingling, and after this it is to be laid on a block, and beat with a beetle, or prepared in mills for that purpose ; after this it is heckled, that is combed, through three or four combs, of different fineness, which separate all the foul stuff, and lay the threads even ; after which it is fit for spinning. This may give a short view of the manu-

manufacture of the plant : but it naturally falls into other hands than the farmer's. His best care will be to find a purchaser for it when carried off the ground ; and we may venture to affirm, that the more of it is raised in any country, the readier will be the market for it in any form.

C H A P. XIX.

Of Hemp.

THIS is a more robust plant than flax, and easier cultivated : the profit will not be less upon it ; and the quantity, that is annually imported, may shew the nation will be a gainer, as well as the particular person who raises it.

In some parts of England it is now cultivated very successfully, and may be brought with great profit into others.

The proper land for hemp is a dry, light, and deep mould. The black earth of the edges of the fens, where it lies tolerably dry, serves this purpose excellently ; and several of our deep loams answer as well : the bottom should be a sandy loam, such as brick earth, and this is common under the soil just named ; or a firm gravel will answer very well. Clay is no good ingredient in the soil for hemp, and it makes the worst bottom of all ; for hemp will

will not succeed where the land retains a cold moisture.

A small enolosure, that lies low, is the fittest situation; for hemp, though very large above the ground, roots but slightly; and in an exposed situation would be liable to many accidents. The best soil will not bear hemp to any advantage, if it lies wet, as is the case in many rich meadows, which have therefore failed entirely.

Stoney land, when not too full of stones, nor encumbered with such as are too large, will bear hemp very well, provided there be depth in the soil; but if it be shallow, and the stones large, it will not come to any thing.

Gravelly ground is not so good as stoney, properly so called, for it is colder. Gravel consists of flints and pebbles, but the stony matter, which makes the right stony soil, is fragments of lime-stone, which are warm; and this is an essential article to hemp.

A field being chosen that has a proper soil and situation, the next care is to get good seed; this is not very difficult, but it must be punctually regarded. Hemp seed is soon damaged in keeping, and it shews the mischief by being dusty: after the first year also, the shell grows weak, and the seed may be easily broken. The farmer should always buy the seed of the last year: he is therefore, for these reasons, to judge of it by its cleanness, brightness, and firmness. The farmer should not look
at

at any that is not perfectly clean and glossy, and, to try it farther, he is to rub it a little between his hands; if it bears this without breaking, it is new, and well prepared.

It may be raised successfully, by the common husbandry, but better by the new method of horse-hoeing. The quantity of seed is to be proportioned accordingly, for in the common way there must be allowed three bushels to an acre; and, in the horse-hoeing method, five pecks, or a very little more, will be sufficient. Whichever method is chosen, the ground must be got in very good order for it. Hemp will grow very well after corn and pease, or corn and turnips; but the finest crops of all are produced upon new broken up pasture ground: a piece that has been in saintfoin, or lucern, will raise hemp also very well; sometimes the farmer will have an opportunity of sowing it upon a piece that has been wood land, and this will succeed excellently.

Dung is very prejudicial to hemp, but marle answers excellently for this crop: in general, where that cannot be had, the horse-hoeing husbandry should certainly be used, because tillage will serve in the place of those manures, which would be hurtful.

When hemp is sown in the common way, the land must be deep, and well plowed. It must lie in ridges all winter; in spring it must be plowed again, and then harrowed; after which it should be rolled with a heavy roller,
and

and then harrowed again: this last operation must be very carefully performed, and it will fit the ground for the seed. If the season be favourable, the best time for sowing hemp, is the beginning of April: any time before the fifteenth will be very safe; for this, though a large plant, is a quick grower.

The seed is to be sown by hand, going only once over the ground, and spreading it carefully and evenly. This done, he must see the ground carefully harrowed to cover it; and if showers fall as soon as this is done, he is happy; it is a season at which they may be expected, and he should chuse a time for sowing, that seems to promise rain. After this the great care is to defend the ground from small birds, for they are great devourers of hemp seed. Two or three boys should be kept upon the ground constantly, with a pistol loaded with powder, to be discharged occasionally, till it begins to shoot. All this care may very well be allowed to hemp at first, because it requires none afterwards: the culture of the ground has certainly cleared it from old weeds, and the crop will grow too fast to let any of the scattered seeds of others do any mischief.

Very profitable crops of hemp are to be raised by this common and easy method; but the horse-hoeing husbandry, or the drill method, with smaller intervals, will probably answer better.

If

If the drill be used without the horse-hoe, the hemp should be sown by it in treble rows, fourteen inches asunder, and an interval of a foot and a half between every three and three. by this means a hand-hoeing may be given to the ground, when the plants are up, and they may be properly thinned, which cannot be so well done any other way.

The plants in the rows should be this way cleared, to the distance of a foot and a half one from another, and they will all thrive. There is another advantage attending the drill method, which is, in a manner peculiar to hemp; this is the pulling it conveniently. From the same seed there rise two kinds of hemp, the male and female, and these are to be pulled at two different times; this may be done very easily, when they are sown in rows, with convenient intervals, the male being pulled away without hurting the female; but it is not so easy in the common, or promiscuous way of sowing. The horse-hoeing method gives this advantage, and a great deal beside. The hemp is much easier managed by this method, the ground is left in better condition after the crop, and the quantity from the acre is at least as much, while the quality is better. It is asserted by those who have tried, that the threads of hemp raised this way are vastly superior, in strength, to those of the common produce.

In this method the hemp should be sown in double rows, at eighteen inches distance, and

T

in-

intervals left just enough for the horse-hoe, between pair and pair. The hemp should have three horse-hoeings, while it is growing; one at four inches high, a second when at half its growth, and the third, when it is nearly full grown. The crop will thus rise to its highest perfection, and the hemp will be easier wrought, and more durable, than such as is raised with less nourishment.

In whichever way hemp is raised, the management of it, when ripe, is to be the same. The male hemp produces a kind of dusty flowers, and is smallest in its growth; the female produces the seeds, and is larger. The male, when it has flowered, begins to decay, and that is the time of gathering it. The leaves first droop, and afterwards grow yellow: the stalk is then in perfection, and these plants must all be gathered. They are to be pulled up by the roots in the same manner as flax, and this gives a new dressing to the ground, breaking the soil, and clearing the way for the roots of the female hemp to spread with all possible freedom. About Lammas, this part of the crop will be ripe: the pullers must be cautioned not to damage the female, which is much the most valuable part of the crop; but in the common way of sowing, it is impossible to avoid this: therefore the drill husbandry is partly preferable. In this case, the pullers can walk between the rows, and need hurt none of the plants that are to remain. The horse-hoeing method is most advantageous of all for
this

his purpose, because of the large intervals, in which the male hemp may be made up into bundles, and cured without the least hurt to the other plants.

The male hemp being gathered, the female is to stand till the beginning of October. It is then to be pulled in the same manner as the other, and made up into large bundles. The stalks in both kinds are to be cured by a slow, and regular drying; and this is to be done by setting them up in those bundles in the field. When the male hemp is dry, there requires no more trouble about it; it is fit for market, or for working at home: but the female has also the seed, which is a valuable article, and this is to be thrashed out when the plants are dry enough. They are then fit for sale, or for watering, as the other. As the hanging or fading of the leaves is the mark of the male hemp being fit to gather, so the female is to be pulled when the seed is ripe, the stalk always is in the right condition at the time when this is full grown, and moderately hardened; therefore, when the seed begins to fall, the farmer is to watch his crop, and when he finds the greater part of it grown firm, he is to order the hemp to be pulled.

The horse-hoeing husbandry always fills the seed better than the common method.

If the farmer chuses to work the hemp himself, it is to be done just in the same manner as flax, by watering, braking, and carding; and he thus brings it to the condition of the

heckled flax, in which state there is always a demand for it; but it is most to his advantage to sell it as soon as dried, and return to his proper occupation.

To this account of the culture of flax and hemp, it may be useful to add a very valuable essay on the flax culture, in the country where it is best understood:

It is written by an understanding man, who has lived long in Holland; and it is well known that flax is a considerable branch of the trade of that country.

The Dutch are, without contradiction, the surest guides we can follow on this subject. The difficulty is to draw from them the necessary instruction; for they are in general, jealous of their secrets, which are forbid to be discovered under severe penalties; above all things they make a mystery of their method of preparing flax. Very few people find means to penetrate into the places where it is managed; and these must not be in the least suspected of being drawn thither by any other motive than simple curiosity; but no foreign merchant or manufacturer is ever admitted.

The soil of every country is not fit for flax, which requires fat land: and too much care cannot be taken in choosing that where we propose to sow this plant: for upon this depends the quality of the grain, together with the number and strength of the stalks. In some countries, however, they followed a quite contrary method, preferring a light and warm soil:

true

true it is, the flax which this produces, yields a fairer, finer and softer thread ; but the harvest is indifferent, and in these meagre lands, the grain degenerates from the first or second year. On the contrary, in fat soils that are a little moist, the flax bears excellent grain, and the stalks are very fine. The Dutch, whose flourishing trade evinces their dexterity in this particular, sow very little flax in the province of Holland, because the soil of it is poor ; but in Zealand where the land is extremely fat and moist enough, they reap that which they employ in their manufactures. The linseed which they rear in that province is sold dearer, and much more esteemed than that which is brought from the Baltic.

This assertion may seem contradictory to an incontestable fact, which is, that the Dutch themselves yearly purchase the linseed of Riga : but the solution of this seeming paradox, is very easy. The Dutch bring linseed from Riga, only for the use of other countries ; and this is not because their own seed degenerates, but because they have not a sufficient quantity for the foreign demand.

Although I advise people to choose very fat land for their flax, I do not pretend to say that in these only flax ought to be sown. I maintain nothing more than that they are the best, and that other lands are only endowed with degrees of goodness, in proportion to the qualities by which they approach the nature of those fat lands. And indeed, although I have

condemned the use of light soil, as it may be proper to have fine thread, I shall not at all oppose the practice of sowing sometimes weak ground with linseed. There will even be an advantage in cultivating soils of a different nature. We shall have linseed of our own growth, without being obliged to have recourse to that which the Dutch bring us from Riga.

After having chosen a suitable piece of ground, we must give it the necessary preparation before it be sown : and this is the method which is followed in Flanders and Zealand. To fatten the ground, the Dutch make use of dung, ashes, and sometimes human ordure : but this last sort is only used in small spots of ground which has long lain fallow. They, moreover, employ marl, lime, the cleansings of pools, the rasping of horn ; and upon the sea coast, they gather for the same purpose, the sea-weed, which forms a kind of glue upon the surface of the waves. These different fatteners, which are preferred according to the difference of soil, are excellent for flax ; being much better than dung : for, if this last is not sufficiently old and rotten, it raises among the seed a sort of weeds which grow in great number, and do infinite injury to the flax, in spite of all the care that can be taken to extirpate them. This inconvenience is not to be feared from the use of marl, lime, sea-weed, and raspings of horn ; and this advantage certainly deserves the entire consideration

tion of the farmer. Weeds, (and these I call parasites, which grow contrary to the inclination of the farmer) weeds, I say, do abundance of mischief to all sorts of grain, but to flax in particular. For, they change its quality, and diminish its quantity.

With regard to the labouring part, in Zealand where the ground is fat, strong and moist, two different methods are followed. The Zealanders plough the land thrice, four times, and even oftener, and leave it fallow during a whole summer; or else they begin by making it bear the seed, and in that case, this is their method of managing it. After having dunged and tilled it twice, they sow the seed. The following year they plant it with madder, which remains upon it for the space of two years, and in the fourth they sow their flax. By these means they are sure of having a well wrought soil; for besides the repetition of labouring bestowed upon it, before the sowing of the seed in the first year, besides the fermentation of the dung, and the other labourings which are sometimes repeated to the number of five times, in order to prepare it for the madder, they are obliged to be continually at work upon it, in extirpating the roots of that plant.

Ground thus prepared, one would imagine ought to reward the cares of the farmer. Nevertheless, the Zealanders themselves prefer the first method; when they want to have the

most plentiful crop of linseed. And indeed the abode of the madder in the earth, for the space of two years, must greatly diminish the richness of the soil. The Zealanders follow this last method, for no other reason than the benefit which accrues to them from the madder: which benefit is such, that the produce of their lands managed in the manner I have described for four years, being added, is more considerable, than if they had practised the first method.

In Flanders, where there is no trade for madder, and where the lands are extremely strong, especially in the neighbourhood of Courtray, the farmers do not sow flax until after having let the ground lie fallow a whole summer and winter, and then laboured it several times successively. In the driest and highest soils that will bear flax, as that round Antwerp, Ghent and Bruges, the people think it necessary to labour them three times, and never sow the seed, until they have let them lie fallow for one summer at least. When the ground is rendered sufficiently moveable by these different labourings, the farmer's next care is to give it the last preparation for its receiving the seed. In Zealand it is disposed into uniform beds separated by small ditches: the beds being from fifty to sixty feet broad, and the ditches about two or three feet deep, and a foot and an half broad. This disposition maintains a suitable degree of moisture in the ground: the breadth
and

and uniformity of the beds keep them in a condition to retain water, enough to secure them from drought; and the ditches sunk at proper distances, discharge the superfluity in time of excessive rains.

This method cannot be too much commended: a farmer by putting it in practice, need not be afraid of sowing linseed in a fat ground, though it is very moist; for the ditches will not only free the field of that water which might otherwise rot the seed, but will likewise leave moisture enough for the growth of the plant. The Flemings are so much persuaded of the necessity there is for a certain degree of moisture to the flax, that in their light and dry grounds they make no ditches at all: but usually, make the surface of the field very even and uniform, that it may longer retain the rain-water.

The soil being well prepared, we must choose the seed proper to be sown; and surely, the farmer cannot be too careful the choice. That which is short, roundish, firm, oily, heavy, of a shining or clear brown colour, is accounted the best: and the peasant of Zealand is very attentive in examining if all these different qualities unite in that which he is about to sow. In order to ascertain its firmness, he takes a large handful, and squeezing it until it pierces between his fingers and thumb, judges of its solidity by the quantity which is squeezed out by this compression, and by the
flow

slow manner in which it comes out. To know whether it is heavy, he throws an handful into a glass of water: that which is good soon goes to the bottom; and he rejects that which swims on the surface. To prove its oiliness, he throws some into the fire; and when it kindles and sparkles as soon as it touches the coals, he makes no scruple of employing it. There is besides, another method used in Zealand, which is to sow some of the seed in little beds of earth; and in a little time, they see by the effect whether or not it is of the right kind.

All seed in general, soon degenerates, but particularly linseed, let the soil in which it is produced, be never so strong; for which reason it is proper to change the seed, and the more often the better. The most common rule followed on this occasion, is to sow in strong ground, the seed which is gathered from a light soil, and to commit to a light soil what has been produced in a strong one. This is certainly a very good rule, when properly understood: for if it is literally followed, we run the risque of being mistaken. Certain it is, light grounds yield seed of a very feeble quality, which cannot with any advantage be employed in the same kind of soil; and a farmer ought never to sow lands of this nature but with a view to have fine flax: he will always be mistaken when he expects good seed from it. The rule therefore needs explanation. And here it is:

Among

Among fat lands, there are some which are more or less so, without losing their title to that denomination. In order then to have always good seed, we must sow in strong ground, that which has been produced in ground of the same kind, though not quite so strong. On the contrary, in ground that is strong, we must sow seed which hath been produced in ground which is still stronger. The smallest difference in the nature of the soil is sufficient to hinder the seed from degenerating.

By observing this rule we shall free ourselves of the slavery to which we are now subject, in using the seeds brought from Riga. The disadvantage of receiving it from the hands of the Dutch, who supply us, is greater than may be imagined. Besides, that we are not sure they bring the best, we run the risque of having that which will not agree with our lands: for, we buy it in the dark, without a possibility of knowing from what kind of soil it has been reaped. Consequently we run the hazard of sowing our field with seed produced from the same kind of ground, in which case, we must necessarily have a feeble crop: for lands, though situated at a great distance from one another, may be absolutely of the same nature.

The quantity of seed sown upon any field, has a great influence upon the crop. If we sow a smaller quantity than the field is able to bear, the whole will be profit by that deficiency;
the

the stalks will be strong, and the seed excellent. If the seed be sown thicker, the flax will produce a finer thread; the harvest will be more plenteous; but the seed will be of an inferior quality. This last method is practised by the Dutch, who are in no fear of a scarcity of seed. But it is the farmer's business to know the nature of his own ground; and he will be guided by his interest and experience. A strong ground may bear a greater quantity of seed, without any detriment to the quality of the fruit which it shall produce. On the other hand, in a ground that is not quite so strong, the same quantity of seed will rise but indifferently, and produce very little advantage. The Dutch and Flemings employ about three or four bushels per acre.

Linseed must be sown in mild, dry weather: and may be committed to the ground in the month of March, if the season be favourable. Being thus early sown, it will be ripe at the end of June, or in the beginning of July at farthest; and the farmer will have leisure to manage it in a proper manner. This expedition will also furnish another advantage. After the harvest of the flax, we may sow turnips or other things of that nature, which will succeed to admiration, and usefully occupy the ground, which would produce nothing during the remaining part of the year, if the season had been more advanced when the flax was ready to be cut down.

I have seen some farmers in Holland and Flanders, sow clover grass some days after the linseed had been committed to the same ground. This herb far from hurting, facilitates the growth of the other plant. In all probability, the young grass secures the roots of the flax from the coolness of the rain, and at the same time shelters it from the heat of the sun. I do not know whether this explanation of the alliance between these two plants is just; but it is well known that flax and clover rise very well together, and that, after having taken away the first, a very good crop of the last will remain.

There is very little to be said upon the manner of sowing linseed. I shall only observe, that the sower must follow the ridge in a direct line, throwing the seed with his right hand, and in returning use the left hand: for it is of great consequence that the seed should be equally scattered. Some days after, when it is time that the seed should be buried, they sow the grass-seed, if they choose they should come up together. Both are covered by the harrow, and pressed by roller. As to the weeding, that operation begins, when the blade is two inches high, and continues until it is five: but it is dangerous to use the heel of the shoe in crushing the weeds, because thereby the flax is sometimes damaged.

Some farmers pluck it before it hath arrived at maturity; pretending that the thread is fairer

fairer while the plant is green. But they are mistaken, and lose their seed without any indemnity ; for the flax yields the finest thread, and that in the largest quantity, when the plant is seasonably pulled : so that the farmer who anticipates the time of its maturity over and above his seed, loses one half of the crop. The filaments of this flax, suffer great waste in the different methods of dressing, and fall almost together in hards : for what resists the pond, the sowing-press, and the hatchel, is of an inferior quality to that which would have been produced, had the flax been pulled up when ripe.

The Flemings, whose experience may be depended upon, leave it growing as long as possible, on purpose to have a finer thread ; and that they may have it as ripe as it can be, for the manufactures of linen or lace, they often run the risque of losing the seed, which easily escapes.

When the flax begins to be yellow, or rather to approach a citron colour, it is usually time to reap it. But in order to be more certain of its maturity, they pull a few stalks, and take out the seed, which when firm and of a clear brown colour, the flax is ripe. The Dutch wait until the pods are ready to open, and even until some of the ripest are actually so : but the best advice I can give upon this subject, is to delay the harvest of flax as long as possible, without running too great a risque
of

of losing the seed, which last, as well as the flax itself, is the better for this delay.

Some farmers have observed, that a kind of mildew falls upon flax that is sown in light ground, about fifteen days before its maturity; and that this corrosive dew burns at first the seed, and afterwards the stalk. If this observation be true, those who cultivate flax in a light ground, ought to pay no regard to the custom of others, who delay the harvest until the flax be entirely ripe. In Holland, the flax being pulled, is laid softly upon the ground in large handfals, the head of the plant being always turned towards the south; and several handfals are put one over another, until the heap is a foot and an half high. Care must always be taken to lay the heads towards the south: for the flax being thus disposed, continues to receive from the sun the degree of maturity it may want, and is secured from the rain, if any should fall. But this disposition is only observed when the weather is uncertain; for when it is dry, they content themselves with spreading the flax by handfals upon the field, that it may be the sooner ready to be carried off. If the season is favourable, twelve or fourteen days are sufficient to make it perfectly dry: but when the weather is wet, they are sometimes obliged to leave the flax in little heaps, for the space of eighteen or twenty days. In countries exposed to high winds, this method will not avail. There it is made
into

into heaps that stand on end, exposed to the sun, in order to be aired and dried. In some places, the flax is bound and put up without being seeded, and in this manner it is kept till the month of December: by this management however, we run the risque of losing the seed. But in Holland and Flanders, it is shelled as soon as the flax is brought from the field. In these countries it is not the farmer who bestows upon the plant the management necessary for its employment; for as soon as it is reaped, it is delivered to the workman, who dresses it accordingly.

Flax is easily lodged by the winds and rains, and as it sometimes cannot be raised again, this accident ruins the hopes of the planter. In order to obviate this misfortune, some people divide the field in little squares of five feet; fix a forked stick at every angle, and when the flax begins to grow up, lay across these sticks, small long poles, which serve as a support to the plant: but this precaution is attended with expence. Others, instead of poles, use cords; but these do not so well answer the purpose. When care is taken not to use too much seed in sowing, the stalks that rise are strong enough to support themselves; but then the flax does not yield such a fine thread.

C H A P.

C H A P. XXI.

Of the new Lucerne.

THIS is an article of great concernment to the farmer ; for there is, perhaps, no plant whatsoever by which it is in his power to get so much advantage among the article of artificial grasses. It is, therefore, worth his while to be very careful in getting the seed, and in suiting the ground to the crop, for without these he will not see all the advantages of it ; and as the thing is new, deceit and error are more easy. It is but of late we have got into the use of the artificial grasses ; we have been led into it by foreigners, and we have not yet the best kinds. Lucerne suits warmer climates, and though we raise it here to great profit, it does not thrive so well, nor yield so largely, as in its native soils. This plant, which from its likeness to that in value some call by the same name, with the addition of the distinction new, is a native of England, though we neglected it ; while the Swedes, under a yet more unfavourable sky, have raised it to the greatest benefits : they celebrate it in their writings, and speak of it as they find it, calling it the best of all food for cattle. It is a kind of medick trefoil, known from the rest by its robust stature and flat twisted seed-vessels. We have it

U

by

by way-fides, and on waste-grounds, in Hertfordshire and the adjoining counties, but not very common. The root is perennial, and spreads far as well as runs deep in the ground; the plant is fifteen inches high, and full of branches in its wild state, and may be made much larger by culture; I do not speak from imagination, but experience: I have not yet raised it purposely for tryal; but in this neighbourhood I saw, three years ago, a plant of it upon a bank in a corn field, where there were few weeds about it, and the ground was in good order, that had risen to very near a yard high, and branched into a bush of three quarters of a yard diameter: we may know by this what regular culture would make of it; as it appears the Swedes know this already. The branches, as well as the main stalk, are fine but not woody; the leaves grow in three's as in the Lucerne, and the flowers are like those of that plant in shape, but they are yellow: they stand upon the ends of all the branches, and upon short stalks from the bosoms of the leaves, in long thick spikes crowned with close tops of innumerable buds: the seed vessels are broad, flat, and a little twisted: the leaves are naturally large, oblong, and of a considerable breadth. Culture will improve and enlarge them as much as it does those of the common trefoils; which may be seen in the comparing brood clover, with the common honey-

honey-suckle grass of our meadows. This new Lucerne is also a very quick grower as well as the other : the root reaches so far that the plant is always well fed ; and when the main stem is cut down, it sends up immediately many in its place : the whole is eatable ; all cattle are fond of it. The produce in hay will be many crops in the year, if well managed ; and there is no danger from turning cattle in to feed upon it, for it is so hardy as scarce to be at all hurt by them in any weather. It will remain as long in the ground as the other artificial grasses, and will require no more care than they do. Common Grass growing among Lucerne always destroys it ; but this plant will live very well in common with that growth in pastures ; this gives it a double utility, for beside raising it by tillage as the artificial grasses, we may also sow it in poor pasture-grounds, and enrich them extremely. The Swedes are the only people who have tried the plant in any light of utility, and they declare, not only generally, but in a very particular manner, in its favour. They constantly observe, that where it grows in pastures, the cows yield more and better milk for it. This is a vast and an uncommon merit, for we find that most foods, which encrease the quantity of milk, debase its quality.

When the farmer shall think it proper to raise this plant by tillage, his first care must

be to save good seeds from the wild plants at home, or to import them from Sweden, where they are now become an article of traffick.

The soil they require is a dry, rich, loamy earth, and they will bear a higher situation than many of our other crops: the richer the soil is, provided it be dry withall, the better the plant will succeed; and the opener the ground also the better: so much observance we owe to nature: for we see what soils produce it naturally, and no other will succeed when it is to be raised by art.

As to the preparation of the ground, there needs to be none particular for it: it may be introduced in the common way of husbandry, after barley that has followed wheat, after a pea crop, or after turneps. Manure it does not much require; but the more culture it has the better: therefore, of all methods, the horse-hoeing husbandry will best suit it. But the farmer, who has not the implements for that, needs not omit it for that reason. The drill plow should certainly be used in sowing it, but it may be hand-hoed or horse-hoed as shall best suit the farmer's circumstances and convenience. When it is intended for horse-hoeing, the ground should be thrown up in beds very deep plowed underneath; and upon these the seed should be sown by the drill plow in double rows, at a foot distance row from row, and with five foot intervals. If the crop is intended

to

to be raised by hand-hoeing, the drill plow should be employed in the same manner, and the ground is to be prepared for the seed by very deep plowing. When it has been harrowed smooth, the seed should be sown by the drill in the same manner, in double rows at a foot distance, and with an interval of a foot and half between every pair of the rows. When the plants are four inches high in either way, they must be weeded. The method is to pull or cut up with the hand-hoe all the weeds that are between the rows and about their edges; and then the plants in the rows must be thinn'd: the strongest should be left, and they should stand at about eleven inches distance, not over-against one another, but each opposite to the middle of a space between two plants in the opposite row. After this, if the horse-hoeing method be followed, the intervals should be plowed up when the plants are six inches high, and repeated occasionally, as has been directed in regard to Lucerne; or, if only hand-hoeing be intended, that is to be repeated once when the plants are beginning to bud, and they may then be left to themselves. Autumn or spring will answer equally for sowing, but there will be the difference of one year's crop according to the choice. If the plants have the winter to root themselves in the ground, they will be very strong the next summer; but if the seed be

not sown till spring, the produce will be small that year. When the farmer cannot spare the land one season, it is therefore necessary that he sow this plant in autumn; but if he who raises it would make the most of it, and allow it all the advantages which its excellence deserves, he should sow it in spring, the earlier the better, and give it all that summer and the succeeding winter for its growth; cutting it only once in the summer, which should be in June, when it will be getting into flower; and that not so much for the quantity it will yield, for that is trifling in comparison of the crops which will come afterwards, as for the preventing the plant from flowering and exhausting the root. This is the method intended in the preceding directions for its management. If it be sown in autumn, all that will be required will be once rolling the ground upon it, in a favourable dry day after a slight frost: this will fix the earth properly about the seeds, and they will shoot at leisure: the growth above ground will be little, but the roots will be strong; and the hoeings, whether by the hand or horse-hoe, must be done in the succeeding spring when the weeds appear.

After this, as often as the plants approach to flowering, they may be mowed; and the crops will not be less than two or three in the summer, with good feeding-time beside. In this manner the crop will continue improving
for

for five or six years; and be at the height of perfection for as long a period afterwards, and the ground will then be fit for other kinds; for this plant rooting deep, the upper coat of earth will be scarce at all exhausted. Beside this great use of the new lucern, in the way of tillage, there is another scarce less considerable in the article of pasture Ground.

It will grow among grass, as well as alone, and will be equally acceptable to all cattle, if eaten fresh among the natural pasture, or in hay. For this purpose the seed should be sown in autumn, only scattering it by hand among the grass; but it will thrive best upon those bleak and exposed high grounds, where nothing else will grow. It is not speaking too largely to say, that the crop of grass, whether for feeding, or for hay, may be rendered double in quantity by this addition, and improved at the same time greatly in its quality; for with the natural sweetness of that kind of grass, this plant will give also abundant wholesome nourishment.

One particular use there will be in such a pasture, which is so considerable, that no farmer, were it for that reason only, should be without it. This is the recovery of sheep which have fallen into diseases from feeding on unwholesome, poor, and wet pastures. This is the common destruction of those animals; they fall into various lesser diseases, and at last

into the rot; they are at once starved and chilled. We have given the remedies so far as medicines can be called so, but this sort of practice will be greater than them all. It will cure the lesser complaints alone, and give effect to the remedies used for the greatest. In such a pasture they will lie dry and warm, and they will have not only sweet and innocent, but nourishing food; for they will crop the young shoots of this plant, in preference even of the best grass, and it will recruit their strength immediately.

C H A P. XXII.

Of the Rape Plant.

IN many parts of England they make an oil from the seeds of a plant, raised for that and other purposes, which they call rape oil; the seed they also call rape seed; and the plant, the rape, or cole, or the cole-seed plant.

The seeds of the turneps, or cabbage, yield the same kind of oil; but the rape, or cole plant is preferred; because, without spending itself in root and leaves, it runs up to a great quantity of seed; as also, because it is hardier than the others, is subject to fewer accidents, and requires less culture.

This plant is the same which we see everywhere upon dry banks in summer, with yellow

low flowers, and long spikes of seed vessels. It is known in this wild state by the name of wild navew, though we call it rape and cole, when we raise it in fields from seeds brought from abroad. There are so many advantages attending the raising this plant, that it ought to be more universal.

The proper soil for cole-seed, is a rich deep mould, such as is in the fens, but it must be dry. About Peterborough they raise a great deal upon the fen lands that have been drained, and no place suits it better.

Low meadow land, that can be made and kept dry, yields vast plenty of seed from this plant, and any rich mellow piece of ground, that is not too much exposed, will yield a great return with this crop. Beside these natural soils for the cole plant, if the farmer has at any time a new broken up piece of ground that is too rank for wheat, he should sow cole seed, for the ground will be after it in an excellent condition for the wheat, and the crop will be very profitable.

The seed should be got from Flanders, for this always succeeds better than our own; and the farmer must chuse the largest, heaviest, and brightest, that he can get. If it be dusty on the surface, small, pale coloured, or have a musty smell, it is of little value.

The best time for sowing the cole seed is the middle of July. The ground must be made fine, and they must be harrowed in, and rolled

led down with a heavy roller. There is no great fear of weeds, for the plant is strong enough to kill them; and in this way it will afford food for the sheep, at a time when they want it; and will afterwards yield a vast quantity of seed at harvest. The plant being of the turnep kind, the sheep are remarkably fond of its leaves. They dress the ground while they feed upon this useless part of the crop, and the land is, by this means, left in such condition for the next growth, that no preparation can exceed it. In about eleven months, from the sowing; that is toward the end of June, the seed crop will be fit to cut.

The crop should stand till some of the pods begin to turn yellowish, and to split. Those at the bottom of the spikes do this first: and when the generality of the plants are in this state, the whole should be cut. A sickle is the usual instrument; and a great deal of care is required in the people; for the seed will shed, unless very carefully managed.

When the plants are cut, they must be laid gently on the ground, and must not be stirred till they are dry; this is soon the case, for they have very little juice: and a great deal of the seed, that was green when they were cut, will ripen as they lie upon the ground.

When the upper pods are dry, and the seeds hard, the whole is sufficiently dried; the best way then is to thrash it in the field, for a great part of the seed would be lost by loading,
ing,

ing, carrying, and unloading again at the barn. The best method is to spread out a large sheet in some level part of the ground, and to lay upon it such part of the crop as is nearest, and thrash it there. After this the haulm may be taken off, and the sheet moved a little, and so on till it has been carried through the whole field, emptying it as there is occasion.

The cole plant is so excellent for sheep, that many judicious farmers have sown it constantly for that use alone, leaving no vent for the seed.

The leaves are more numerous than in the turnep; they are also better tasted, and more nourishing. If the farmer have this use of the plant principally in his eye, it is certainly best to sow it in the common method; but when the seed is the great point in view, it should be drilled in double rows, at a foot distance, with intervals for hand-hoeing. The horse-hoeing method has been recommended, but the plants will get strength enough without these large intervals, and that expensive tillage.

C H A P. XXIII.

Of Woad.

EVERY one has heard of the use of woad in dying; and in the few parts of England, where it is raised, the farmers have
a great

a great deal of advantage from it. Where there is a proper soil, it may be brought into many other places with as much profit. It will, with good management, yield four crops in a year, and all of considerable price.

The woad is a robust plant, of a yard high, with great blue-green leaves, and little flowers followed by little pods of seed.

Woad requires the same soil that cole seed does; it must be rich, deep, and dry; drained fen land, dry meadow ground, or any earth of the like kind, in a situation to be out of the reach of wet, while the crop is growing, will answer the purpose. A good deep loamy soil will also suit it very well: even sandy soils will raise woad, but not to equal advantage with those before-mentioned.

The ground must be plowed up deep, and all the lumps must be broken by harrowing and rolling; and, finally, when the seed is to be sown, the whole surface must be laid very level.

We need not go out of our own country for the seed of woad: as good is produced here, as in part of the world, but let the farmer be careful that he gets such. It must be heavy, hard, and clean, glossy on the surface, and free from any ill smell. Five quarts of it are to be allowed to the acre, and he should buy at the rate of a pint an acre more, to have it ready to make up deficiencies, where the woad has failed, or has been destroyed in its
first

first growth. The quantity, here directed, is for the common way of sowing: when the drill and horse-hoe are used, half, or less than half the seed will be sufficient.

We see very good crops raised in the common way of husbandry, yet it is easy to see, that by the help of the horse-hoe, there may be much better. The proper soil for this plant is such, as perfectly well suits that culture; and the frequent crops of the leaves expected every year can no way be obtained so well, as by that method, which gives fresh nourishment at those times the farmer chuses. There is also another advantage, which is, that the crop will be easier, and more conveniently managed by means of the large intervals.

If the farmer chuse the common method, he must sow the seed very even, and harrow it in; if the horse-hoeing method be followed, the seed should be drilled in double rows, at ten inches distance; and there should be such intervals left, as will give room for the horse-hoe to work conveniently.

Woad is to be sown in the latter end of August; and the new seed of the same year that is just ripe, and hardened, should always be preferred.

When the plants are two inches out of the ground, the farmer should examine where there is any deficiency, and sow some of the seed there, which he saved for that purpose.

Three

Three weeks after this, the hoers must be sent in to cut up what weeds are risen, and to thin the plants where they stand too close; they should be left at about a foot distance. Then they are to remain all winter; and if they are sown in the common way, this is all that can be done for them; but in the horse-hoeing husbandry, the matter is much otherwise. In spring, when the leaves are taking their first shoot, the intervals must be very well broke up, and this will set the leaves to growing, and give them full nourishment for the whole period of its growth, which is to be only till the leaves are fully got to their bigness. When that is obtained, they are to be immediately gathered, for they begin to fade soon after. The exact time cannot be determined, for it depends on the season; but the farmer may always know when the leaves are ready for gathering, by looking into the field.

When the leaves are grown to their full bigness, and are firm to the touch, juicy, and of a good green, they are ripe for cutting. They should be immediately cut, and the ground cleared for the next crop. As soon as the fresh gathering is off, the intervals must be very thoroughly horse-hoed, and there will, in a few days, be a new appearance of leaves, which will make the same swift progress to their perfection.

They

They are to be gathered, as soon as ripe, in the same manner; and the ground plowed up between them, to give new vigour for the next, and thus throughout the summer season.

This is the management by horse-hoeing, in the common way of husbandry; the gatherings are to be made in the same manner, but the crop will be fewer, because no assistance, or very little, can be given them, while growing; and the second crop will be worse than the first, and so on to the end of the season. In this manner the crop may very well stand two years; but at the end of that time it must be plowed up, and a new piece sown; or, in the horse-hoeing husbandry, the middles of the intervals, which will be very fine by these repeated plowings, must be sown in the same manner as the field was at first; and thus the same ground, and some culture, will produce store of woad for a vast succession of years.

In this case, the seed of the same field must never be sown again, but an exchange made with some farmer at a distance. A few of the roots in the warmest and driest part of the field, must be left, from time to time, for seed; and thus the whole management for the present and succeeding years, will go on easily together.

C H A P.

C H A P. XXV.

Of Coppice Plantations.

TH E R E may be pieces of the farm so situated, and of such a nature, that it will not be easy to manage them in the common course and method of husbandry, and these will always succeed in plantations of coppice wood, provided the proper kinds be chosen for planting; and there are so many of them, that this will be very easy. The barrenest ground will bear coppice wood, nor is it any objection if it be wet in many places; there are coppice trees that love a wet soil.

If it be very far from the house, and therefore inconvenient to manage in the common way, neither is this any disadvantage; for the spot being once enclosed, and the plants in the ground, the whole may, in a great measure, left to nature.

Our barren heaths, in many places, might be enclosed, and planted with copse wood to a great advantage; and a vast deal of ground that is left waste in many estates, will this way produce large profits to the owners.

The first article for the raising a coppice is to have good seed. This may be either sown on the spot, or in a nursery, from whence the plants are to be removed at a proper growth; but this is a double labour, and the generality
of

of the kinds do not succeed so well as in the way of raising them where they are to stand. This, therefore, is the method we shall advise the farmer to follow: and let him proceed in the following manner.

First, Let the fences be thoroughly repaired, that no cattle, nor, if possible, any other creature can get through; for the young shoots of trees are a very tempting bait to almost all kinds of creatures; and when the young growth is once cropp'd by them, it is a very considerable time before it recovers; and, perhaps, never entirely: for the first shoot being destroyed, and the remaining part mangled by the creature's teeth, there will not come such another.

When the fences are secure, the ground is to be prepared. It should be plowed as deep as possible; and this must be repeated three times, at small intervals. After the plowings, the whole must be very well harrowed, and made perfectly fine.

The best kinds for coppice wood are these, the birch, the ash, the maple, the hazel, the white thorn, the witch elm, the crab; and the fallow; and common willow for wet places: these are to make up the body of the copse; but there should be timber trees also sown in a proper quantity among them, the oak principally, or any other kind, according to the nature of the ground; in all the damp

parts of the spot the fallow and willow are to be raised; the others in such as is dryer.

The trees being all common, the farmer should save the seed of them himself; he may be greatly deceived if he buys it. He should chuse good, healthy, and thriving trees, or shrubs, of the several kinds for having seeds, and let it hang upon them till ripe: then, when he has shook, or beat them off, he is to lay them a few days upon a barn floor to harden, and to throw out all that are light, bruised, or any way damaged. Let the fine seed be kept carefully, till the following spring, for if sown in autumn, a great part of it would be destroyed by vermin before it shot. The best way of keeping it is, when thoroughly dry, to put it up in paper bags, and hang them to the ceiling of an airy cool room, where they will keep without danger, either from the weather, or from vermin.

Early in spring let the ground have the last of the three plowings, after which let it be rolled to break the lumps, then harrowed with a short tined harrow; and when it is thus laid perfectly light and level, let the seed be sown.

This must be done by a very careful hand, and a little seed is enough; for this is not expected to rise like any other crop.

When the seed is spread it must be rolled lightly, and then harrowed in: this answers to the

the treading in, and raking of seeds by gardeners, which is the best of all ways of sowing.

When the young plants begin to appear, care must be taken about weeds, for they would over-run and destroy them: but after they are well up, no more weeding will be needful. The first weeds must be pulled up by hand, and the farmer must not regard if there be many thin places, for the seeds shoot up at different times, and what spots are vacant now, will be full enough hereafter.

When winter comes on, some care must be taken of the most exposed parts of the ground. A few black thorn bushes should be laid over those places, and lie upon the young plants all winter.

The following spring all the plants will be up, for there are some of these kinds, whose seeds lie a year before they shoot; but now he may suppose all above ground, that will rise at all: therefore what spots are vacant now, will continue vacant, and they must therefore be supplied. Where the plants have risen too thick, some must be pulled up, and planted in those places; and the ground, being once more weeded, is to be left to nature.

The next spring he must look over the ground again, still pulling up a few plants where they grow too thick, and laying down a spare shoot in other places to make a new growth where they happen to be too thin. This is the time when the care should be taken

to have the plantation all of a thickness, and being once set right now, the rest of the growth will follow naturally and easily. In the thinning of the growth, care must be taken to pull up the weakest and the worst. This is the last trouble that will be required, till cutting; for all the rest is growth, which will now be very quick without the labour of the farmer: only if, by accident, any part should become vacant afterwards, there should be some truncheons of willow, fallow, poplar, or other quick growing trees, that will take in this manner, thrust into the ground, to make up the deficiency.

One article more remains to be considered, which is, the cutting down the coppice wood at a certain growth. Some suppose this is always necessary; but tho' it may be in some cases proper, it certainly should not be made an universal rule. When this is done, it should be at four years growth; a very sharp bill is the proper instrument, and they should be cut off within an inch and a half of the ground. This makes a stump, from whence there rise a number of shoots, and they will grow well shaped from the cutting; but when the ground is good, and the plants grow well, there is no occasion for this trouble, or for the loss of so much time; for the first cutting will be best made when the plants are of a serviceable size; and after this the young growth will be the more numerous, because the stumps will be stronger,
and

and the roots better established. In middling situations it will be best to observe the middle course, by cutting down, the fourth year, all the ill growing ones, and leaving the others as they stand.

After this the plantation will require no care: the coppice must stand to the time of the first felling. This should be at about thirteen years growth; but there is no fixing the time exactly: in very favourable soils and situations it may be cut the twelfth, or even the eleventh year; and in those which are the poorest and most backward, it may not be fit till fifteen years; but this is to be determined by the size of the shoots; for it would be absurd to cut them before they were fit for service: and when they once are so, the sooner they are down the better. After the first felling the growth will be much quicker: every eight years, in middling soils, the coppice will be fit for cutting again; and thus it will yield a very great increase, and be more profitable than most other growths: and when the roots are worn out, wood land is always fit for good crops again. The season for felling lasts from Michaelmas to the end of February: at this time, all the wood that has been cut should be cleared off the ground; and the fences made up, that the stumps may stand free to make their next shoot, and the growth be out of danger. The coppice must be felled with a careful hand, and sharp instruments; for if

the stumps be haggled they will rot; and the next growth will suffer extreamly. They should be cut off at a stroke, sloping downwards, and should be about three inches and a half above the ground. Oaks and other trees should be left standing at due distances for timber; the straightest and best growing should be reserved for this purpose, and they are to be trimmed up carefully for a good stem, leaving a sufficient head for drawing up the juices. This is the management of the coppice plantation; all that need farther be said, is, that in case of accidents by cattle the first year after felling, the mangled shoots should not be left, but be cut off clean; for it is better to lose one season, than to have a weak and irregular growth, such as always comes after these injuries.

C H A P. XXV.

Of Hedge Shrubs.

MANY shrubs have been recommended for hedges; but the common white-thorn exceeds them all; therefore the farmer's eye should be always upon this, though at the same time he should know what others may be proper where this kind will not grow. The white-thorn should be raised from seed in a nursery, and the plants taken out of this, at a due time, for making the hedges. The
nursery

nursery need not be large, but no farmer should be without one: the expence is scarce any thing, and he will always have his sets in readiness, and good in their kinds. The soil of the nursery should be a poor dry loam; and it must be very well fenced. The ground must be prepared, as we have directed, for planting the coppice; and the seeds sown in trenches. The seeds or haws should be gathered from stout and well-growing trees, and when full ripe: We have many little differences in the white-thorn of our hedges, and that kind is the best of all which has the smallest leaves; for it is always the most bushy and the most prickly: the haws, gathered from these trees late in the autumn, will be fit for sowing the succeeding spring.

The ground, having been well plowed, is to be harrowed over in February, and then drills are to be opened four inches deep, and about two and twenty inches one from the other: the haws must be spread thin in these trenches, and covered up, and thus they are to lie till they shoot, which will be early the second year. The ground must then be kept clear from weeds, and the plants take their growth till their stems are half an inch thick: there is very little trouble in this, and the plants will be numerous, and in great perfection.

When a hedge is to be made, begin with the ditch in front; this should be a yard wide at top, and somewhat more than half a yard deep.

deep, and very narrow at the bottom: the earth dug up out of this ditch makes the ground-work of the hedge. The turf is to be laid even, with the grass downward; then the mould is to be laid upon this; and then let the sets be brought out of the nursery: they should be cut off with a knife at five inches from the ground, and brought in: they are to be laid upon this bed of mould at twelve inches from one another, and with the heads slanting upwards: they must be covered half a spade depth with mould, and upon this must be laid some more of the turf, bottom upwards: then there must be laid another coat of mould a full half spade deep, and upon this must be planted such another row of quicksets as the first, one in the middle space between every two of the others: these are to be covered in the same manner with more mould, and then the bank must be finished in a ridge at the top, with the stuff that comes from the bottom of the ditch. The planter should have a gardener's line of five and thirty foot long, and at every length of this he should plant a young elm, oak, ash, or other timber tree, letting it in deep into the bank, and placing a stake by it to keep it up and secure it: then a dead hedge must be made at the top of the bank, which will secure the young growth from accidents, and thus the whole work will be finished.

This is the best of all hedges: there may be occasionally planted among it a few fallows, especially

pecially in the damp parts, and a few black-thorn sets in those places where their spreading at the root will be of no disadvantage. In all places where the soil will bear these they make the best fence; but there is another when these will not succeed, and therefore such as are of an inferior kind must do.

The FURZE bush makes a very thick and strong fence; and as it is a native of the poorest soils, and most barren spots upon our heaths and sands, it will thrive as a hedge-shrub, where the white-thorn would fail for want of nourishment. When any one has a mind to enclose a piece of common, or any waste land, in a sandy soil; or if the farmer has a piece of ground so dry and barren that the common hedge-shrubs will not thrive upon it, this should be his fence. The furze must be used alone, and it should be raised from seed: the French furze is the best kind for these services; and it should be sown in the place where the hedge is to stand in spring. The ground should be well plowed up in autumn, and it should be thus till Lady-day; then let it be plowed again as deep as the plow will cut, and immediately after roll it with a heavy roller, to break any little clods, and harrow it.

About the middle of April sow the furze-seed upon this ground, and harrow it in; raise a small dead hedge on each side of the ground to prevent the young growth being trampled down by cattle; and when the plants come

come up, thin them to four or five inches distance, and weed the ground. After this from time to time let them be weeded, and thinn'd more and more by taking up the weakest plants: in one season they will be sufficiently rooted to preserve themselves against weeds, and in three seasons they will make a very safe and handsome fence. After this it will require no care for several years, but when at length it grows weak and shabby, it must be cut down close to the ground, the earth plowed up at a small distance on each side of the roots, and a dead hedge raised on each side as before: with this care it will shoot as strong as at first, and continue beautiful and secure as long as at first.

The CRAB is a very good addition to a hedge, but it will not make a good one alone: the branches do not grow so thick, nor are the leaves so numerous as in the white-thorn, and therefore this shrub is neither so good for shelter or security; but in a mixture it does very well. In the making a quick-set hedge, if every tenth set be a crab, the fence will be more beautiful: some use may be made of the fruit for verjuice, and the strength and shelter of the hedge will be sufficient. The same soil suits this as does the white-thorn: a deep loam is best of all.

The BLACK-THORN loves a somewhat moister soil than the white; and the bushes of this are so excellent for a dead hedge work,
that

that a quantity should always be raised for this use. The fence this shrub makes alone, is neither so tall or so close as the white-thorn; but with good management it may be made to answer that purpose, while provision is made for a quantity of the bushes for other service. The proper spot for such a hedge, is in enclosing a piece of poor, and somewhat damp ground. The sets should be raised from seed, as was directed by the white-thorn, and the ditch and bank for the plantation should be made just in the same manner, excepting that the bank should be broader, and the sets be in a larger number, and their heads made to come out on each side: they should be placed one every six inches, and the heads to come out alternately on one side of the bank and on the other: they must be secured by a dead hedge on one side; the ditch will serve that purpose on the other; and thus they will take their growth securely. The whole care afterwards must be, that they do not run out too far into the ground, which this shrub is very apt to do, it being its nature to spread at the root. These suckers should be pulled up as soon as they appear; and the hedge will by this method of plantation be so thick, that a small extent of it will produce stuff enough of this kind for all the farmer's occasions.

C H A P. XXVI.

Of Timber Trees

THE great article of timber trees, so far as it regards the farmer's practice, is comprised in those plantations already directed in his hedge-rows, and the shoots left for timber in his coppice-woods: but as it may happen that there may be ground in other places fitter for trees, than for any other produce, or the particular situation of the place giving a demand for timber, we shall add the best method by which timber trees in general are to be raised.

All timber trees should be raised from seed, and the first shoot preserved; the coppice wood will shoot as well when the stump is cut off: but it is otherwise in those trees whose straitness in the stem is their great value.

If the oak be the kind intended, chuse a deep tough loamy soil, and a situation free to the air, but not too bleak. Gather the acorns from a tall, healthy, and well-grown oak, when they are fully ripe; spread them on a barn-floor for a week, turning them every day; then put them up in large pots of dry sand, and keep them there till spring. In the middle of February dig up the places where they are to stand. They should be five and forty feet asunder, and the ground must be dug up
in

in each place two spades deep, and very perfectly broken: then the acorns are to be planted five in every spot, and covered two inches deep with mould: a fence must be made about the spot, and thus the acorns left to shoot. When the plants are four inches high, it will be easy to see which will make the finest tree: the others are all to be pull'd up, and a stake must be thrust into the ground near this one to raise it strait. As they grow up the head must never be touched; and only such of the side shoots must be cut off as grow too low or spread too wide. After a few years the tree will be out of danger, and will take its growth slowly and securely. The ground will not be wasted that is between: it will serve for pasture as well as if there were no plantation there; or other small wood, particularly ground-ash, may be raised on it.

The **ASH** loves a light, dry, rich mould, and the best situation is upon a level, or nearly level ground. The best way is to raise it from the seed upon the spot where it is to grow: and there needs no particular direction to be given; for the same management, as is required for the oak, will raise this to great perfection. About five and forty years will bring the timber ash to its perfection; and at that growth it will be of great value.

The **ELM**, which is in general a useful wood, is particularly valuable in the neighbourhood of London, because of the great quantity

quantity and constant waste of the water-pipes. For this service straitness in the trunk is its great value; and though our hedge-row plantations supply a great deal, yet it may be worth while to raise it in other places.

III. The proper soil for the elm is a deep mellow earth, where there is some moisture: the situation should be low, and not too much exposed: the common elm is the best kind, and no tree is raised more easily. The elm may be raised from its seeds; but the suckers are so numerous, and grow so well, that there is no reason to trouble one's self about the other. The great care must be the trimming them up for a strait trunk; but our common practice is to leave too small a head. A leading shoot should always be preserved, and a good bush of branches about it.

The BEECH is a valuable tree, and will thrive in poor soils, and the most exposed situations, on rocky hills, and even in sand. This gives it a great additional value, because it will occupy ground that would be otherwise of little use: it may be raised in single trees, at distances on such ground, or in clumps, or in whole woods, sowing this alone. In general, the timber of those trees which stand most single, is the best.

Many propagate the beech from suckers, but the best way is by seed. The mast is produced in great abundance; and it should be collected from tall, strait, and well-growing trees

trees which stand single, not in woods or clumps. If a wood be intended to be raised, the ground must be deep plowed, and the whole managed as in raising a coppice, only that the young trees are to be thin'd to twenty feet distance. The raising it in clumps, or single, must be in the same manner as the oak.

These are the principal timber trees; and if any other kind be prefer'd, the same method should be observed in raising them: the only exception in this case regards the aquatics, or those trees which grow by waters, the poplar, the willow, and the like: these are propagated the most easily of all, for no more is required than to cut a strait piece of a branch of eight or ten feet long, and thrust it by the largest end a yard into the ground, where it will grow without more care.

Pollards, or stump trees for shrowding, may be raised of any of these kinds, also in waste corners or by road-sides: they are to be propagated as the rest, only at about fourteen feet high they are to be cut off; that instead of growing up, they may shoot out a number of branches.

CHAP.

C H A P. XXVII.

Of Soils and Manures.

SOILS may be comprehended under a few general kinds: manures are much more numerous. Clay, sand, and mellow earth are the three great original kinds; and from these, in various admixtures, arise all the common soils, which we call, loamy, clayey, sandy, and the like. Chalk is a peculiar ingredient, and in some places almost constitutes a soil itself; and in other places, fragments of stone or quantities of gravel are so mixed with the upper course of mould, that they give it the denomination of stoney or gravelly soil.

This is a short account, yet this is all: few of the pure soils are good for the farmer, except that of mellow earth; perhaps scarce any. What he requires in his land, is a free course for the fibres of the roots of his crop; and, with that, a sufficient firmness to hold them up in their places. Mellow black earth, such as we have in some low grounds, will answer both these purposes, therefore it is fit for use alone; but the rest serve to mend the faults of one another. Nature mixes them together for the making the common soils: and art may imitate her where she has not. On this mixture depends the natural excellence of soils.

The

The most common soil of all is loam : this is a mixture of clay and sand, with some pure earth among it. Clay alone is not fertile, because it is too tough and cold. Sand alone is not fertile, because it is too loose and hot : but the one of these added to the other takes off, in either case, its faults ; making a soil, which again becomes richer as there is more of the good mould among it.

On these principles the farmer may not only judge of the nature and value of the soils, but mend, or in a manner new make them with one another : and this ought to precede the use of what are more distinctly called manures. Thus if his land be sandy, clay will serve as a manure ; and being laid on in a large quantity, it will alter the very nature of the land, converting it into a loam ; and in the same manner sand will improve his land when it is too clayey. If he have a poor loam, he knows, by the same rules, that he may enrich it by dressings of absolute mould, or of pond mud, which is of the same nature ; and if in any other place he has pure black mould, which wants firmness, he may improve it by a dressing of loam, which will give it the condition of the richest loamy earths, and those are the very finest of all soils.

These are additions which give a lasting alteration to the soil ; and after the use of these, properly come in manures : therefore let the

Y

husband-

husbandman, before he thinks of fermenting his soils with dung or the like ingredients, first bring it, if faulty, into a proper condition by these additions ; or occasionally bring on these with the other lighter dressings. Marle is a peculiar dressing, and answers both the purposes of amending and fermenting the land : calcined clay, in some degree, approaches also the nature of marle : of these we shall have occasion to speak hereafter ; but we are now to consider the use of the more common manures.

HORSE-DUNG is the most universal of all manures. There are many kinds suited to peculiar soils, but this agrees with all : it enriches any kind of land, provided the farmer takes due care to mix it with the mould ; for otherwise, in tough soils, it will be washed off, and in very loose ones it will run through : but with good management it always gives fertility, and, perhaps, in fair reason, will maintain its character of the first manure in value, for ever.

This may teach the farmer to be careful to save and manage it in the best manner ; and in this he wants great advice : for nothing is in general worse conducted than the dunghill. Old horse-dung is always better than new, because being mellowed in lying, it operates more regularly ; but in the common way of keeping it loses great part of its virtue. The farmer throws it up in a heap in the air, where the sun exhausts a great part of its best strength ;
and

and after this the rains soak through it, and run off red and full of its strongest particles. All this might be prevented, and the full virtue of the dung kept in it to any age by a little care. The dunghill should be made in a piece of ground that has a little descent, and it should be sheltered by trees: a trench should be dug round it, into which the red liquor should drop, and this should be received in pits in two or three places, from whence it should be now and then thrown up over the dunghill again. Thus the sun and winds would have no influence over the dung, and the rains would wash away no part of its virtue; for whatever they took would be returned upon it again, and by degrees soaking through would mellow it all the way it run.

This would be the best method of preserving dung alone, but it may often be advantageous to make it into compost. In this case a pit should be made to receive this, and the other refuse of the house; it should be clayed at the bottom and sides: the urine from the cow-house and filth from the hog-styes should be conveyed into it by channels; and, with the dung, should be thrown in pond mud, and every thing that comes under the name of manure, which happens to lie conveniently. The refuse of the garden, the ashes, and even the pots, should be emptied into it; and these, all rotting and mellowing together, will make a manure, preferable to the best dung alone:

there will be more of it in quantity, and it will be free from the mischief of breeding weeds. A little before it is to be used, equal quantities of common mould should be mixed with it ; and after these have fermented together, the whole will be as rich as common dung alone, and will communicate its virtue to the land more readily than any other way, because of the fermentation that is begun already with the first quantity.

When the dung is to be used for pasture-ground, the best mixture with it is river mud. It must be spread upon the ground in autumn, when there is a prospect of rain ; and in this manner it will wash in entirely. For land that is in tillage, the best time of laying on dung is just before the last plowing but one : it should not be left at all upon the surface, but immediately plowed in : because that way it saves all its virtues, and rots by degrees in the ground. Dung, thus prepared and thus laid on, will continue its virtue very well for three crops ; but the quantity must be proportioned to this expectation, and to the nature of the culture. In the common way of husbandry, eighteen load should be allowed to an acre : but in proportion as the new method is introduced, and more tillage allowed : the quantity of dung may be reduced. There is no instance where less than ten load should be used to the acre. All is not true that the writers who favour

your horse-hoeing have said ; but with this addition of dung a great deal may be done.

The quantity of dung should be also in some degree proportioned to its natural richness : the better the food of the horse is, the richer the dung will be. Stable-kept horses that are fed on oats yield the finest dung of all ; and that of horses fed on hay is better than such as comes from grass food alone. Horse-dung picked up in the yard, unmixed with straw, or with the urine, makes an excellent top-dressing for a sickly crop of corn ; and that mixed dung, which may be collected upon roads, in those places where horses stand to urine, is excellent for certain purposes. This has always among it a great deal of the salts of the urine, and some of the road dirt, which is harsh and sharp, in the nature of sand ; especially where the roads have been mended with ballast or gravel. This carried fresh from the road, in a dry season, and laid upon a stiff land, exceeds perhaps any other manure whatever. The value of stable-dung will also depend greatly upon the quantity of litter that is used ; when this is too large in quantity, the dung becomes poor in proportion : there should be as much as will be well moistened by the urine, and no more. Where dung is used together with the horse-hoeing husbandry, the best kind is such as is old and well rotted, or such as is picked up pure from the ground : it should be laid on just before one of the horse-hoeings, the quan-

tity moderate, and never more than once to the same crop. In the new method of husbandry, clayey, and other tough soils will require dung more than any others; for it prevents the particles of the land from growing hard again by uniting after the tillage. That kind of tillage also is less suited than any other to this method of culture. Some have advised the mixing of lime with dung. I don't know whether there be experience to support this method; but am very certain that it will not always succeed: they are excellent alone, and, I think, had better be kept to their proper services.

Cow-DUNG is a fine, rich, and naturally mellow manure; it gives fertility without heat, and lasts a great while in the ground, but its power is not equal to that of horse-dung: the Romans preferred it to any other; but experience does not support all they say. Cow-dung differs according to the manner of feeding, and is always richest when the creature has the richest food. Mr. Lisle gives an instance of this from the common practice of one of his acquaintance, who had found that there was a great difference between the dung from one kind of hay, and from another: where they foddered their cattle with good and fine hay, they found the effect of their dung was vastly greater than when they gave them a worse sort. It is worth the farmer's notice, that gardeners, who are the nicest judges of
all

all these things, prefer cow-dung to all other kinds, for making the rich compost for their flower-beds ; which is, because the effect of it is never violent, but is very lasting : therefore cow-dung may certainly prove an excellent thing in the hands of the intelligent farmer, though in an indiscriminate use it would often disappoint his expectations. Cow-dung, being the coldest of all kinds, must never be used alone by the farmer, unless on the hottest and dryest soils ; for all other uses it is best mixed with horse-dung : in this case they improve one another. A very excellent dressing for warm, sandy loams, is this : mix up equal parts of horse-dung and cow-dung, and one third part of the same quantity of river mud : turn the heap as it lies, and when well mixed, spread it upon the ground, just before plowing. The same mixture, with a little of the dirt of the roads, makes a dressing for somewhat colder soils, which does them as much service. For clayey grounds, sea-sand and cow-dung, with a small quantity of horse dung among it, is also excellent. Cow-dung is a very favourable manure to the artificial grasses, particularly to Lucerne, which plant horse dung, unless very old, also hurts.

SHEEPS-DUNG is rich and warm ; and this, like horse dung, will be a great deal the better for having the urine and perspiration of the creature mixed with it. The farmer usually has this advantage, because he folds sheep

upon his ground, in order to enrich it by their dung, but this limits the use to certain occasions. We have begun to learn from Flanders the method of preserving the dung and urine of sheep, and even their perspiration, by means of earth laid under them where they rest at night; and there will be great benefit in making the practice universal. The earth, in this case, does what the straw among horse-dung does; it soaks in the moisture, blends the whole together, and assists the fermentation. This can never be done so well by any thing as by earth, because of the natural agreement of this with the soil, wherewith it is hereafter to be mixed.

The best method of doing it is this: run up a light shed with cribs all round it, and cover the floor a foot deep with some loamy earth. When the sheep have been folded in this eight or ten days, and it is covered thick with their dung, spread more of the same earth upon it half a spade deep, and do the same once in eight or ten days after this, till there is enough of the manure to carry out; then clear it away, and begin again in the same manner. All the earth will be enriched and made mellow by the dung; the digging it, and loading and unloading, will mix it sufficiently. and it will be ready at once for use. The sheep, that are fed on downs, may be housed at night, throughout the year, for this service; and the others, which

which are folded on open lands, in summer, may be kept thus in the winter.

The cold and stiff soils get the most advantage from sheeps-dung, and no way so much as this, because it is in a state of fermentation with earth when laid on; and there will be no danger of its washing away without impregnating the soil, as it might from these tough kinds, in any other method.

Hogs DUNG is in itself very rich, but its substance is light, and unless it be very well managed, will be lost upon the ground: the best way of securing and keeping the virtue of hogs-dung entire, is to cover the bottom of the sty with some kind of earth that may receive the dung, urine, and sweat of the creatures, and detain them in a fence, wherein they will not waste till used. Chalk has been used in some places for this purpose, but there are many fitter kinds. Nothing is so proper as a middling loamy earth, such as we find in good loamy soils: and the most profitable way of using it will be this: cover the bottom of the sty a full spade's depth with this, and let it remain ten days; then near the sty make the foundation of the hog dunghill: lay a coat of the same mould upon the ground to a considerable extent, four or five times equal to the breadth of the sty; upon this lay the mould dug out from the bottom of the sty, and put in its place so much more: cover up that, which has been taken out, with more of the same earth; and thus proceed, taking out the
bottom

bottom of the sty once in about ten days; and when it is laid on the heap covering it, and adding more: thus there will be, in some time, a large dunghill of well-fermented earth, fit for carrying to the land, where it may be wanted: the virtue of the dung will be equal in a manner through it all, and it will give a fertility for several seasons. As there will be earth carried in, as well as dung, this will be a proper dressing for the poorest lands: the ground will not be apt to produce weeds, but crops will be fed upon it to great advantage; whereas, in other ways of using this dung, it is supposed to fill the land with weeds, and not without some reason, since it is one of the richest manures we have.

If this method be not followed, the best way is to make up a compost of hogs-dung, with horse-dung, cow-dung, and the litter of the yard: this will in some degree preserve the virtue of the hogs-dung, and the whole will be very rich. Hogs-dung is excellent for meadow and pasture-land; and for this purpose it is to be used alone: but care must be taken as to the season, for if rains do not follow, all of it will be lost; the sun will exhale its virtue in a very few hours after it is spread, and the winds, if dry, will blow it off the ground like chaff; but if rain come immediately, it will be washed entire into the earth, and will make the grass shoot with a surprising strength.

The

The poorest lands may also be enriched by feeding hogs upon them.—Any of the hog-pease may be sown for this purpose; and when they are ripe the hogs are to be turned in, and are to lie a night and day there; they will feed themselves very finely, for pease are their best nourishment of all; and the land will be so enriched by their dung and urine while fed on it, that it will be ready for a crop of corn. There has lately also appeared a proposal for feeding hogs with clover, sown for that purpose; which, it is said, will in the same manner prepare the land excellently for a crop of corn.

PIGEONS DUNG has been always known as a most rich and excellent manure; but it has been found too hot for some uses, and too soon wasted for others. The principal purpose for which the farmers value it at present, is for sprinkling it upon a crop of wheat in spring, which wants refreshment: and it succeeds best of all upon clayey soils, and such others as are naturally cold. But if the farmer will follow the before directed practice of receiving it upon a loose earth, and using it incorporated in that, and naturally fermented with it, he will find great advantage, and may extend its use extreamly. Pigeons-dung is sometimes used on land newly sown with barley, but if dry weather follows, there is very little good to be expected from it; otherwise it does most service. In the way here advised
it

it will enrich a barley crop in a manner altogether surprising; for it is the nature of this dung to fill the ear, without encreasing the height of the stalk. Forty bushels to an acre is the quantity commonly allowed, but it will do three times the service if rightly managed.

The method I would propose is this; throw into the bottom of a pigeon-house as much rich black garden-mould as will cover it half a spade deep; let this lie to receive the dung, the waste-feathers, and refuse of the food, and all other matters which come in the way: when it is well impregnated do not take it out, but cover it with as much more: after a due time throw in more again, and so proceed till there is a yard depth of this manure at the bottom of the place; then it will be a time to take it out. This will make a most excellent dressing either for wheat or barley land; and the best time of using it is just before the sowing: it will by this means be quickly buried, and by the succeeding harrowing will be thoroughly mixed with all parts of the soil, and the advantage will be seen in the shoot: the virtue will not be exhausted by the present crop, but will shew itself in the succeeding seasons. One thing farther may be done relating to this matter, which is to lay upon three or four parts of the covered bottom of the pigeon-house a lump of clay, tempered with bay-salt. This will bring the pigeons often down, and will
procure

procure more dung, and richer than they would otherwise yield.

HENS DUNG is known to be valuable, but it is so little in quantity, and so difficult to be managed, that few trouble themselves about it. But even this may be made a valuable article by the same management. A great deal of it will be scattered about the yard, and the grounds where they feed, but it will be easy to preserve some of it. For this purpose let the bottom of the hen-roost be covered with a sharp, loamy earth, and let there be one place only where they are fed : let this be covered loosely with the same kind of mould, let them be encouraged every way to come to this place, and to stay there ; partly by food, and partly by being quiet and undisturbed. The ground being loose they will lie and roost in it, which will give it a great deal of virtue, and it will be easy to rake it over with a good garden rake, and now and then to bury the dung. If the chamber-pots be emptied upon this spot, the poultry will not like it the worse, and it will be a prodigious advantage ; because all that the dung of these creatures wants is saltiness. One thing more may be done to favour it ; for the ashes, being sifted there, will still give more of the loose dry quality these creatures love : there is no expence in this, and there is very little trouble. The farmer's business should all go on in this manner ; and while he is managing his least affairs rightly and regularly, he will

will find great advantages grow up. There will, by degrees, be a dunghill formed in this manner, which without the least expence will amount to several loads, and will be a manure to which none whatsoever is superior. The use of it is equally good for corn and grass ground; and the time of laying on is in autumn for the grass, and just before the sowing of the corn. The rains, in one of these cases, and the plowing in the other, mix it immediately with the ground, and its effect is seen in the great vigour of the produce. There is a common opinion that the dung of geese causes land to be barren, but it is perfectly a mistake; and the farmer need make no particular provision on that head, but take the dung of geese, turkeys, ducks, and hens together.

HUMAN EXCREMENTS have been used as manure, and they are, without doubt, the richest of all kinds whatever; because the virtue of dung is always proportioned to the richness of the food. But there is great inconvenience in the use of it, and a beastliness in the thought of employing it for the growth of corn, which is to go immediately down our throats again. This should be a reason never to employ it as a dressing for corn lands; but there are crops which we may very properly improve by it; and as its rich nature is undoubted, the only care required is how to use it conveniently, and to what crops to apply it. Hemp
and

and flax require a very rich ground; and exhaust a vast quantity of nourishment; therefore nothing can be more proper than to supply these from that rich source; and, in general, for all crops but corn, this may be made an excellent manure. Those, who have attempted to use it in England, endeavoured to mix it with straw in the manner of horse dung, but this could not succeed, for it does not heat so readily; it never would mix, and the urine was lost; therefore this was soon given up. The value of the urine of all animals is now sufficiently known in the improvement of their dung; and the urine of our own species will be found as superior to that of all other creatures as the excrement; and for the same reason, because it is produced from richer ingredients. The true way of using both these will be by incorporating them together with the mould, in the way before directed, and nothing can be so easy: let the farmer properly manage his necessary-house, and all the rest will follow in consequence: he will have this, as many other manures, gather of itself, without his care or trouble. Instead of a well let him place under this building a good quantity of loose light mould. The first thing should be to dig away the earth a spade deep; for the space of thirty feet square, throwing it up at the sides; then he should dig the bottom of this shallow pit a full spade depth more, breaking the mould very well. Upon this the excrement

ment and urine are to fall, and they will spread their virtue as far as the ground is dug, because it is so far loose and ready to receive it. After there is some quantity fallen, the mould, that was thrown out in making the pit, should be thrown over it; and being covered, it will mellow the better in the ground, and lose nothing of its virtue. When this mould has been used, and there is a fresh quantity to cover, more mould must be brought; and thus the quantity made up for a year or longer: then it is to be dug away, and used upon the land a little before seed-time; it will be as cleanly and as well mixed as any other manure. It may be used on poor grass grounds in autumn, after they have been eaten bare; but no cattle must be turned into these grounds again, till the manure is thoroughly got into the ground, for they will not eat the grass till it is sweetened from it by the air: but after a due time the growth will be full and sweet, and they will be very fond of it. We know the Dutch and Flemish use human excrement as a manure; perhaps it is to their flax, while we have idly thought it was to their corn.

Beside these already named we have a great many lesser manures, which yet deserve high regard: we call them less, because they are not to be had in such quantities as the others, and some of them only in particular places.

Soot is a very rich, warm, and excellent manure; but it can only be had in any quantity
near

near great towns. The soot of London is sold to the farmers of Hertfordshire, and is one of their most valued dressings. The quantity they allow is from fifteen to twenty bushels to an acre. The best time of laying it upon the ground is the beginning of March: the crop wants some assistance by that time, and there is nothing which gives it so immediately. Coal Soot is of the two the best for clayey and chalky soils, and wood soot for the more warm and loose kinds, particularly for poor loams and gravelly grounds. Pasture-ground will receive the same advantage as tillage-land from this manure. The time for using it there is autumn; and if the farmer would see the full value, he should allow thirty bushels of it to an acre.

ASHES are excellent also as a manure; but there is a great difference in these, according to the fuel which has afforded them. Wood-ashes contain most salt; but coal-ashes have a more lasting effect. Wood-ashes should be used on loose and light soils; coal-ashes on such as are tough and heavy. The wood-ashes are best alone, or mixed with a little pond-mud for the convenience of spreading them. The coal-ashes succeed very well alone upon mossy pasture grounds; but for corn lands they should be used with dung. The best way of using wood-ashes is to keep them dry and close beat down, till they are wanted; and then to sprinkle them by the hand alone, upon the corn-lands

lands, which want refreshment in spring: they serve in the place of soot, and the effect from a like quantity is nearly equal.

For grass grounds, which are over-run with moss, there is no dressing equal to coal-ashes: and for such, as are full of worms and other insects, nothing succeeds better than wood-ashes. At least thirty sacks of either should be allowed to an acre; and beside the effect of destroying that mischievous growth, and killing those hurtful creatures, the grass is always seen to shoot up in a surprising manner after these dressings. Clover and all the artificial grasses will thrive excellently after a dressing of wood or coal-ashes; and it is found by experience, that if the coal-ashes are kept in some place where the chamber-pots can be emptied upon them, they are greatly improved by it. This practice must not be used to wood-ashes, or their salt would be washed away by it, and they would be rendered entirely useless.

But of all ashes those succeed best which are made upon the land: such are the ashes of bean-stalks, stubble, or the like; for they are of double use, the ground being improved by the heat in burning, and in a condition to receive them with the greatest advantage. This is a practice so excellent, that it should be used much more generally. Any refuse that will take fire is fit for the purpose, and it may be brought from elsewhere, and it will answer the purpose as well as if it had been produced up-

on the ground. The best method is to burn the stuff in little heaps, and while they are yet hot and not over-burnt, to scatter them upon the ground : they should be then plowed immediately ; and their heat acting upon the soil, as well as their salts, they will bring the whole to an excellent condition. This method very nearly equals the burning the turf or surface, called burn-bating ; and does not exhaust the land like it.

BURN-BATING is of all dressings of land the most forcing for the time ; but it leaves it impoverished miserably, if the greatest care be not taken afterwards. The method of doing it is this : the turff, or surface of the ground is to be pared off about three inches thick, and this is to be set up in small heaps to dry : after that, it is to be set on fire with some furzes, and is to burn till it comes to a red coal. This is to be plowed in ; and the ground, however barren before, will be able thus to produce a great crop. But this forcing of land is not lasting : and if ever the farmer finds it proper to use this method, let him, after the very first crop, allow a sufficient quantity of manure to prepare for the second, and so on throughout the course of tillage on that ground.

SEA-WEED is an excellent manure where ever it can be had, nothing enriches the land more ; and there is one kind, the benefit of which is of continuance. The farmers in the neighbourhood of the sea coast distinguish

two kinds, the one is a loose light stuff which floats upon the water, and is thrown up by the tides : This is what they use as a top dressing to their lands, to give a fresh vigour to the growing crop. The other consists of sea weeds, which grow to the rocks, and which are to be pulled off when the tide is out. These are of a tougher nature, and are to be plowed into the ground, as the harder kinds of manures : they take some time to dissolve, but they give a lasting fertility. All these sea weeds are highly impregnated with sea salt, which is an excellent assistant to vegetation, and they are full of animal matter also : for the little cells and cavities in and about these plants, are nests and harbours for insects of various kinds.

Nor are these the only manures the sea yields, for the mud from its bottom, wet with the brine, is also a very fine and rich dressing for land. This is to be dragged up, and immediately laid on the ground, for the salts and other parts of sea water, which remain about it while wet, constitute its greatest value. Sea shells and their spawn are also used with great advantage in places where they are found in sufficient quantity. The best way of using the shells is to calcine them with a moderate fire ; this brings them to be a kind of lime, and yet somewhat of the animal nature remains with them ; so that they become an excellent dressing, and are suited equally to all lands. The
spawn

spawn is a gelatinous substance, full of small shells, and may be laid at once upon the land. Small and tender shells may be used, fresh taken from the sea: and there is a kind of sea sand, which is composed entirely of broken shells, which having lain to be calcined and bleached by the sun and winds, are in an excellent state for service. These should be taken up when the tide is just leaving the place; in which case they are not only enriched by the sea water which hangs about them, but by a multitude of other light substances, which the tide always brings with it, and which all tend to give fertility. Sea shells of the larger kinds also, that have lain till they are bleached, may be used with great benefit. The best method is to lay them up in heaps, and beat them to pieces with a mallet; after which they are to be spread upon the ground; the smaller they are broken, the more freely they give their virtue to the land: these kinds are best for the tough and firm soils; for they not only break them at the time, but mellow them afterwards. Shelly sea sand, perhaps, exceeds any other manure for this purpose: the toughest loam will be made light and hollow by one dressing of these broken shells, and will remain in that condition several seasons.

OLD RAGS are another of the refuse substances, which answer the great purpose of enriching land. They can only be had from

great towns in sufficient quantity, but wherever they can be got, they should be looked on as a treasure. The two kinds, linnen and woollen, are equally useful; and the fouler they are, the better. This is a coarse recommendation, but it is a mark of real value; we see what good the perspiration of the bodies of sheep does to the lands on which they are folded, endcreasing greatly the effect of the dung and urine. These rags are rich with the perspiration of human bodies; and experience, the farmer's best guide, shews that no other kind is so fit for giving fertility to ground. The rags are to be chopped to pieces, and then scattered with an even hand over the ground; either at the time of sowing the corn, or just after the winter's frosts, when the young shoot wants refreshment. The first is the best time for the woollen rags, the latter for the linnen ones. In either case, the smaller they are chopped the better. Thirty bushels of the linnen, and five and twenty of the woollen, should be allowed to an acre. The Hertfordshire farmers, who may very well be models to those of all other parts of the kingdom, use these constantly, and would be ready to purchase ten times as much as London is able to supply.

Woollen rags may also be used in large quantities in the place of common manure. The refuse of taylors is not without its value, though it is by no means equal to the rags of the

the worn out cloaths of the poor. The best way of using those fresh and unworn shreds, is to sprinkle them frequently with urine, laying them in heaps, and employing the pots upon them. This gives them an animal salt that is very valuable, though by no means equal to that from perspiration. Experience has shewn the real and great value of all these kinds. These manures suit all soils; but they are found most beneficial of all upon chalks and clays.

DECAYED VEGETABLE matter of any kind may also be used as manure. We find the earth under old piles of faggots, which is full of the rotted twigs, is excellent for gardens: and we might learn from that alone, to value what else we meet with of the like kind; but there are stronger reasons: for whenever the farmer has used any thing of this kind, he has found the consequences in great fertility. In the making of compost cabbage stalks, and the other refuse of a garden, are excellent. Decayed willow stumps, broke with a mallet, are constantly used by way of manure about the fen countries; and saw-dust is very useful to the same purpose. Malt dust is another vegetable refuse, that serves this purpose excellently.

Wherever there is an opportunity of getting any of these, they should be mixed with mould, or made into compost with other rich ingredients. These, like the several lesser manures before mentioned, are fit for any kind
of

of soil; for they presently dissolve and wash in with the weather, and give immediate proof of their effects.

After this general account of the several manures, and their manner of operation, the farmer will be the more readily able to understand the peculiar qualities of two kinds, which have been reserved to the end of these considerations for that reason. These are marle and lime. The former is the richest of all natural manures, and the latter deserves the same pre-eminence among the artificial.

MARLE is of many kinds, but there is none of it which is not excellent for this service. Some Marles are as hard as stone, others as soft as fullers-earth; but these extreams, and all the degrees between these, have their value; and it is often equal in one and the other, only that the hardest require most management, and must lie longest on the ground. Some marles also have a toughness of the nature of that of clay, but it will go off with the weather. And we are happy that nature has, by these various qualities, rendered the marle of different kinds suited to all the possible variety of soils.

The colours of marle are as various as its consistence, and it differs as much in purity or mixtures of shells. We have some marle of as perfect even texture as fullers-earth; and some which is so full of shells, that the whole appears as if composed of them. It is not the worse manure for this, for we have shewn before, that

shells themselves are excellent for this service. There is one quality which distinguishes and characterises marle in whatsoever form it appears. This is its falling to pieces when put into water. By this the farmer always is to try it, and this way he should try every uncommon-looking earth that chance throws in his way, or that he can find by examining where the surface happens to be broken. 'Tis certain there is marle in many places, where it is not known; therefore let the careful husbandman look whenever he has opportunities. When wells are dug or even but a ditch, it may happen that marle may be among the substances thrown up. Our ancestors used marle more than we do, therefore we may often be directed to it by the old pits where they dug it. Thus if we see a range of shallow dells in any place, we should open the earth in the same line beyond them, and probably we shall find it. A loose clay is the most usual bed above marle, and the next is a good mould; where either of these make the natural surface, it is worth while to try under it. And the way of boring is very easy, because it never need go to any depth; for if the marle is not near the surface, it is never worth digging.

All soils may be improved by marle, but the poor sandy ones most of all. It has been said, clay will not be improved by it, and our farmers have brought it to a proverb; but
 clayey,

clayey, as well as other soils, may be improved by it, only chusing a right kind.

When a sandy soil is to be improved, the clayey marle is the properest kind, for this binds and strengthens the soil, at the same time that it gives it richness and fertility. If one of the fine tender fatty marles should be laid upon such a soil as this, it would all be washed into the ground, without doing the least service to that superficial part of it, from which we expect the crop.

If the soil be loamy, the purest and fattest marles are to be used, and the fertility they give is surprising. The more sandy the loam is, the tougher, by some little degree, should be the marle; but in those which incline rather to the heavy, no marle can be too soft and pure for them.

For loamy soils, which are so tough as to resemble the clays, the best kind is the shelly marle; or where that cannot be had, the stony marle first broke well to pieces. The advantage of this is not seen till the second or third year, but it continues a long time in the ground.

When a piece of ground, with a rich mellow earth for the soil, has been exhausted by frequent crops, marle is an excellent restorative; and any kind may be used on these soils. Grass ground will receive as much advantage from marle, as that which is in tillage; and especially when it is of this mellow soil. Though
any

any kind may be used to land in tillage, which has this sort of soil, none but the most pure kind must be used; because if it lies long in lumps, it will do more harm than good upon the ground: but the fine fatty marles, laid on in autumn, wash entirely into the ground, and the grass obtains a new strength, which it retains many years.

If the soil be chalky, there must be a careful choice in the kind of marle. The firm red marles, or that fine fat and heavy blue kind, common in Staffordshire, are the fittest for this purpose: the common pale marles do not answer upon such soils at all.

Gravelly or stony soils require the heavy and tough clayey marles. These remain in them many years, and shew the effect in all the crops.

Clayey soils require the sandy marles, and these break and divide as well as enrich them. Thus one or other of the natural marles are suited to the improvement of all soils; only a right choice is essential.

The quantity of marle is to be much greater than of any other manure: but some have carried this too far. From seventy to ninety load, in general, may be allowed to an acre; and this may very well be allowed, as it lasts a great while in the ground, and comes generally for digging. In the least favourable lands, the effect will last ten years, in some five and twenty. The harder the marle is, the earlier
it

it must be laid on the ground, and the more pains must be taken to break it. The soft marles may be spread by the shovel, as they are dropped from the cart; but those which are hardest should be dropped in heaps, and after a little time broke with mallets; and then after lying a little longer, they may be spread upon the ground. When a marle does not break so readily as it ought in the air, it must be sprinkled at times in the heap with water. Those which cannot be used in the common way, because of their hardness, easily calcine into a kind of lime, which is excellent as manure.

What is said here of marle holds equally true of chalk, of which we have in England many kinds differing in hardness, all related to the marles, and the softest not to be distinguished from the soft white marles. These may be laid upon the ground in their natural form, and spread from the cart; But the harder require either to be exposed to the air, and broke or burnt into lime to be fit for use. When the marle is spread upon the ground, the sooner it is plowed in the better. In level grounds, it should be spread all of a thickness, but in those which lie on a descent, a great deal more should be laid on the upper part than on the lower; because rains will wash down a great deal of it before it is thoroughly blended with the soil. With these cautions, the farmer may

may promise himself a lasting success from this manure, and be secure from all hazards.

C H A P. XXVIII.

Of Chalk.

IT has been said already, that chalk is very much of the nature of marle, and requires in general the same management: but it may be useful to name some particulars of its use. The two soils, which get most advantage from chalk, are sand and clay. But these must be assisted afterwards with dung, or they will be the worse instead of better for this dressing, after a certain number of years. Any chalk is fit for use in its natural state as a manure, that will break in water, in the manner of marle, though slower; and that will moulder away with the rains, dews, and frosts upon the ground. Such as will not, is to be burnt to lime; and never to be used by way of manure any otherwise. Chalk laid on clay, and the land afterwards enriched at times with dung, makes one of the finest soils in the world, and will keep this condition thirty or forty years. Chalk always takes the greatest effect upon lands, where there is none of it naturally in the soil. Therefore the farmers have a rule, that the farther they fetch their chalk, the more good it will do them. The quantity of chalk should be from fifteen to five and twenty load

load to an acre. Some mix dung with it, but the better way is to lay on the chalk alone; and the dung alone the succeeding year. The benefit of chalking all lands, is not so lasting as that of clay; but there is none wherein it will not last a great many years. The best season for digging chalk, is from Michaelmas to Christmas; and it should lie out all winter to mellow. Then in spring it should be broke to pieces, and spread upon the ground, and the sooner it is plowed in the better. If the land be very poor, and the farmer desirous of a good crop the first season, he should allow one load of well rotted dung to every four load of chalk, and the effect will be immediate.

Pasture ground is capable of the same advantage from chalk, as that in tillage, but there requires more care in laying it on: it must be of the mellowest sort, that will break easily with the weather; and it must be mixed with pond mud and rotten dung. One load of each of these, to five of the chalk, will answer very well; and the effect will be extremely lasting.

C H A P. XXIX.

Of Lime.

LIME, for the service of manuring land, is a new practice; but it is worth all the antients knew together. It agrees with most lands,

lands, and the fertility it gives is surprising, even to the most barren. Lime may be made by burning any thing dug out of the earth, that will ferment with acids. Chalk and the hard marles will make lime; but the best is that from stone. We give the name of lime-stone to those kinds which are fit to make it, that is to such as will ferment with acids; and this is so ready a method, that the farmer may always use it easily to find whether he has or has not lime-stone upon the ground. Let him take a little aqua fortis in a vial as he walks over his grounds, and try the stones that are to be had in quantities there. Which ever of them bubbles up on pouring a little of the aqua fortis upon it, will burn into lime; and no other. Lime may also be made of shells, by those who live near the sea, and have the advantage of them, and none is better. A lime kiln is easily made, and any fuel will serve to burn it; therefore it will almost always be worth the farmer's while to burn some for his own use. The fuel and the lime stone, or chalk, are to be laid in beds one over another; and in general, one hundred of faggots will burn forty bushels of chalk. Ten bushels of coals will be about equal to the hundred of faggots; and furze bushes or dry fern will do as well as either. Lime-stone requires more burning than chalk, and 'tis worth the fuel, because when burnt, it is better and goes farther. Chalk loses near one third part of its weight in burning; but
stone

stone does not lose so much in weight proportionably as it gains in virtue.

The soils, which may be most improved by lime, are those which are light and dry : but with due caution it may be used on others. Stony land, and particularly lime-stone ground, may be vastly improved by lime, made of the same stone. This is contrary to the nature of chalk, which never does well on chalky ground ; but we are to account for the effect of fire in the burning. Many of our heaths might be brought to the condition of good land, by the use of this manure alone ; and much sooner, if other enriching ingredients were properly employed with it.

Lime should be laid upon the ground, hot from the kiln ; and the sooner it is there plowed in the better. The quantity should be a hundred and fifty bushels to an acre, if the lime be used alone ; but an abatement may be made in this quantity, in proportion to the other ingredients used with it. The common way is to lay it in heaps on the land, and covering it with some mould, to let it lie there till it is thoroughly slacked ; but this gives double trouble, and the earth has not the full advantage, nor has it so regularly : These heaps must be broken and spread afterwards ; and the corn always rises in rank spots, in the places where those heaps lay to slake, and is ripe sooner than in the rest of the field. If the lime be sprinkled over a piece of ground,
without

without any other care or trouble, it will flake as it lies, and wash into the ground; and there will be a very plentiful crop from that land, though before it was barren. Some purchase lime from distant places, but it loses in carriage: and never is so good as when hot from the kiln. Therefore, as burning it is so easy, all should do it for themselves. According to the nature of the soil, one or other of the kinds of lime before-mentioned should be used, but always fresh. If the soil be a light, and not very poor one, the best of all lime is that made by burning very soft chalk, or some of the marles: in barren land of the nature of that upon our heaths, the lime made of common chalk is best: on gravelly ground, that lime which is made of the hardest limestone, and for stoney land, that has rough fragments of stone, not pebbles; the best of all is that made from the common and least hard limestone.

Although the lime may be used for any of these grounds alone, it will succeed better on the greater part of them, if other ingredients are mixed with it. If the soil be gravelly and poor, the best way of giving lime is with an addition of river mud, and the most adviseable way of using it is this: throw the lime hot from the kiln upon the land, and scatter over it as much rich river mud that has lain so dry, as will very well cover it. Thus let it lie three weeks, and then plow it lightly into the ground.

A a

If

If the soil be hot, sandy, and very dry, there can be no mixture so proper for the lime as cow dung. There is an inconvenience in the using of this dung in the common way, because it dries and hardens upon the ground, losing its virtue in great part, and being also unmanageable. Therefore the dung for this use, should be that of cows fed in the yard, and it should be thrown together, once in three or four days, as it is made, upon a bed of mould, and covered with more mould as it lies, from time to time stirring and mixing it together with a three pronged fork. This makes an excellent, rich, and yet cool dressing, proper to be mixed with the lime, and to allay the natural heat of the soil at the same time that it enriches it. This will help the power of the lime, and also continue its effects.

In very barren soils, old well rotted horse dung may be mixed with the lime, and will in the same manner give a lasting fertility: some strew lime upon those grounds, that they have burn-baited, but this is not a right practice, for the lime is not a judicious choice for keeping the land in heart afterwards, and the burn-baiting itself answers all that can be desired in giving an immediate fertility. The mixing of cow dung with lime, gives it a lasting fertility; horse dung, on the contrary, though it enriches the ground at first, wears it out sooner: lime alone will keep the land in heart

heart five years. Lime with horse dung will give greater crops, but the efficacy will be worn out in four years; and lime with cow dung, in the manner here directed, will retain its virtue in the land very well seven years.

A lime kiln, for the farmer's private use, may be built for about fifty shillings, and such a one will make fifty quarters a week. The attendance and expence of fuel are little in comparison of the richness of the manure it procures; and the materials of one kind or other may commonly be found upon the spot.

The rubbish of lime kilns, which the lime burners call lime ashes, is a manure for cold clayey soils. It consists of small fragments of stone refuse of the faggot wood, or other fuel, ashes, and a little of the waste lime. There will always be a quantity of this about the kilns; and experience shews, that it succeeds very well as a manure on those soils. It must be laid on thick; and though lime would not do well on those places alone, where there is so much toughness in the soil; yet if a small mixture of it, more than is naturally found in the rubbish, be allowed on this occasion, it will answer the better. Where the coat of mould is deep, be it of whatever kind that is proper for lime, the quantity should be large that is laid on; but on the other hand, where it is shallow, there should be less; and instead of expecting its advantage to last five years, it

should be repeated at the end of three ; and if each time a quantity of pond mud alone, or of mud and cow-dung, or the cow dunghill before directed be used with the lime, the land will be in a continual state of improvement.

When the soil is very shallow in pasture grounds, lime sprinkled upon the surface is an excellent improvement. It will make the grass excellent for two, three, or more years ; and at the end of that time, the land will be in a very good condition to be brought into tillage. The poorest grass ground will be made extremely rich and fertile, by a mixture of lime, cow-dung, and pond mud : and like the other, when it has spent the best virtue of these ingredients in grass, it will be fit for plowing up to advantage ; because, by that time, the remaining virtue of them is got to that depth, which the plow throws up to the surface.

C H A P. XXXII.

Of the effects of waters of different kinds.

WE are not about to acquaint the husbandman with the virtues of mineral waters or medicinal springs ; but it may be proper for him to examine carefully the effects of common water on his cattle, and in the other occasions of his family. Of late time, much has been observed on the effect of
I
common

common water, which it is highly needful for him to know.

Gardeners made the distinction first between hard and soft waters, by which we understand those drawn from the well, or received immediately at the spring, under the name of hard; and river, and pond water, by soft. The latter is best for all their uses, and from this there grew early an opinion, that the hard water was fit for very few purposes.

Both have their uses, and all that is needful is to distinguish for which service each is most suited. Well-water should never be given to horses, unless it has stood five or six hours first in the sun and air to soften. Those, who have the care of the fine and more delicate kind of horses, soon found this, and it ought to be known to all others: for though the more tenderly horses are kept, the more they will suffer by this, yet it is hurtful to all. The tenderer all cattle are, the more hurtful pump or spring water will be to them; and the hotter they are, the most cautiously it should be given to them. For as it is much colder than any other water, it will be hurtful by that as well as by its hardness.

It has always been supposed, that soft water was best suited to extract the virtues of plants; and, therefore, it has been recommended for dying and for brewing; but experiments have shewn us, that our fathers fell into great mistakes, and that just the contrary is true in fact.

The hard waters in general answer better for dying, than the soft, as any one may experience by extracting a tincture from the common dying ingredients with one, and then with the other. Dr. Rutty, who has lately distinguished himself by an excellent work upon the mineral waters, asserts, that he found upon experience, the hard water of Dublin drew stronger tincture from many of those ingredients, when used alone, than the pipe water would with the help of alum.

The farmer is not to suppose himself unconcerned in this. Not to mention what concern he may have in dying for his own use, or making trials of those herbs we have named, as being serviceable for that purpose, the extending the rule to brewing is very easy; and experience confirms what we might so probably guess from reason. It is found, that well water will make more beer from the same quantity of malt, and of the same strength than such as comes from ponds or rivers.

Indeed the beer, for very delicate constitutions, is not altogether so wholesome: for it has been observed, that malt liquor, brewed with very hard waters, has occasioned disorders in the stomach and bowels, which nothing would remove till that drink was altered.

The use of water, a little tinctured with common salt, is another consideration of importance. The people of Liverpool brew with such, and they find that it yields as much beer
of

of equal strength from four bushels of malt, as the common soft waters will from five. This is not sea water, but the hard water of a spring, in which there is a very slight tincture of brine.

Mr. Lisle observes, that water a little salt serves also better than fresh for washing of sheep, and that swimming them many times through saltish water answers the purpose of preparing them for sheering better than the troublesome and hurtful method, by scrubbing them in a brook or river. It is not every where the husbandman has the advantages of water tinctured in this manner; but when he is so fortunate, let him know its value. In other places, perhaps, the addition of a small quantity of sea salt may answer the purpose: this is at least very well worth trial.

The differences in the qualities of waters rise from the ingredients they contain, and the uses of the several kinds being known, it is not difficult to imitate them. The chemists have discovered which each contains, and the principal ingredients are salt and acid: now these may be easily added to well water, at the pleasure of the farmer; and he may give those qualities to his own, which he had envied in his neighbours. Salt may very naturally be supposed assistant in brewing, for it will occasion water to take a better tincture from many things than it would without. Those, who understand the making of coffee, always put a

little salt into the water ; and, perhaps, the famous quality of the Thames water, in making porter, may be owing to some small degree of saltiness, which it has from the tides ; and which, though not enough to be perceived by the palate, yet may have that power in brewing.

We have observed before, that many things must go to the making this excellent kind of malt liquor ; and that they mistake, who suppose the advantage of the Thames water to be all which enables the brewers of London to make it preferably to those of other places ; but it may be this unperceived quantity of sea salt may be extremely beneficial in the work ; at least, it is worth while to try. Those have failed, who have hitherto attempted it in other places, and for the future, this should be one of the cautions. The attempt is of great importance, for it would be a certain fortune to any who could do it ; and this, with what we have named before, may lead to it.

The ingredients in our waters of various kinds have not been ascertained till very lately. Mr. Boyle knew there was sea salt in many of them, but he thought it incapable of being crystallized from them, or shewn in its proper form. Dr. Short improved so far upon the enquiry, that he found the proper crystals of sea salt might be produced from many of them. This author could not find an alkaline

salt

salt in them : but Dr. Rutty has very plainly proved there is such a one. Thus by degrees the knowledge of the waters has advanced, and by the examinations of various kinds, not supposed to have particular qualities ; ingredients have been discovered, which very plainly shew the causes of their differences.

For many of the common uses of life the purest water that can be had is the best ; and the difference is so considerable, as to be very well worth notice. In order to guess at those waters, these two rules will be useful : they generally rise from gravel, or they come from springs, situated on the highest hills. Chemists try them, by boiling large quantities away to examine what they yield ; the farmer will see the same experiment tried in his wife's tea kettle : for the purer the water is, the less foulness it can leave at the sides and bottom.

The combe water at Hampton-Court is celebrated by Dr. Hales, as one of the purest waters in England ; and yields but three grains of sediment, when a quart of it is evaporated. The water of Malvern hills, in Worcester-shire, is still purer, for it leaves nothing behind. Dr. Rutty found the water of Mary's Abbey, in Dublin, yielded twice, or more than twice, this quantity of the Hampton-Court water ; and there are others which yield abundantly more. Dr. Rutty, whose experiments are

are accurate in the highest degree, found, that the water of a spring in Meathe-street, Dublin, yielded no less than two hundred and forty eight grains of sediment from a gallon.

There will be no wonder that vast differences are found in the qualities of waters, when there is this variation, not only in the nature, but the quantity also of their solid contents; but by the plain rule we have given, the farmer may judge very easily which are fittest for his service. There are also other certain methods; pure water will readily mix with soap, and it is the interest of the housewife to use such in washing; for a third part less of soap will answer the purposes of washing with this water, than is required with such as is harder. Hard waters curdle with milk, for they contain some quantity of an acid, but soft waters mix with it equally and readily. There are spring waters, which, being pure, mix with soap without curdling, and with milk as readily as the softest of the others; and these are very valuable, they are such as rise from very high grounds, and they are a most valuable possession.

The purest and lightest waters make the best bread, the hard waters not suffering the dough to ferment in a proper manner; and the best bakers can make but poor bread in those places, where there are no other than such water. In fine, it is evident, that the wholesomest waters are those which rise in
very

very high grounds, since the inhabitants of places supplied with that kind of water are longer lived, and throughout their lives are naturally more healthy than those of other places; and on the contrary, the inhabitants of countries where no good water is to be had, are unhealthy in the same degree.

Those, who live where there is only very hard water to be had, should take the precaution of letting it stand exposed to the air some time before it is used, and in general where a family depend upon well or pump water, they should never be without a large cistern near the place, into which the water should be drawn, and in which it should remain two days before it is used. Indeed one cistern, though advantageous, is not enough for this purpose. Those who study the good condition of their bread, beer, and other things, and have a due regard to their own healths and lives, should, in cases where they are only supplied with hard water from wells, have two cisterns near the well, that the water in one of them may have its time of standing exposed to the air to soften, while the other is in use; and it should be a sacred rule never to meddle with the one, till the other were exhausted: for though one or two days will suffice to render well water, according to its degree of hardness, fit for the uses of a family, yet longer standing will always render it so much the better.

These

These cisterns should be of stone, by no means of any thing metalline, and they should be always kept open. They should not be deep, but the greater the breadth, the better. The reasons for all these particular cautions will be very plain when once named to the farmer, and he will find so much more health and comfort in his family, when they are duly regarded, that it is worth his while to observe every particular. The cisterns must not be of lead, because that metal is in its nature poisonous, and any thing acid will in some degree dissolve it, and extract that poison. Now in many of our spring waters, there is a considerable portion of acid, as may be proved by various experiments; and there is no saying how great may be the danger: stone is innocent, and is to be preferred on all these occasions.

The cisterns must be kept always open; for the intent of letting the water in to them, is the softening it by an evaporation of some of its volatile acidity, and the sun and air are the agents by which this is to be done: if the cisterns were to be kept close covered, the water might very near as well remain in the bottom of the well.

Let the farmer understand this properly. There is in all the earth an acid vapour or liquor, called by authors the vague acid, and the mineral acid. This is in all hard waters, and it is what in a great measure gives them
this

this quality, which we call hardness. Hard waters curdle with milk, and it is this acidity which causes it. The same quality is found from the same cause in this water, on many other kinds of trials, and this acidity is to be conquered no way so well, as by exposing the water to the air; for part of it evaporates, and the rest is sweetened by the action of the sun and atmosphere.

For the same reason, the bason or cistern, in which it is kept, should be broad and shallow. The air cannot affect the bottom of deep water, at least not in any degree; therefore if the water be put into a very deep cistern, it may as well be in the bottom of the well. Whatever the free air should affect, must be exposed to it with the greatest possible surface; and, therefore, the broader and shallower these cisterns are, the sooner and the better the water will be softened, and rendered fit for the uses of a family. Some water of this kind requires more, and some less time to bring it to a condition fit for use; but the operation may be rendered much shorter, by spreading the surface. For this reason, when there is but one cistern, that should be made with the more care, according to this rule; the time required for softening the water being gradually less in proportion, as the surface is greater with which it is exposed to the air.

Beside

Beside the saline or acid matter, which evaporates from the water, or is neutralized by the air in standing, there is also in all hard water a stoney or calcareous matter, which sinks to the bottom or sticks to the sides of cisterns. This is the same with that stony crust we see on the bottoms and sides of tea kettles; and the water is always better in proportion, as more of this is separated from it.

Another method, and a much more speedy one, of softening hard waters, is by the addition of wood ashes or an alkaline salt. People without the assistance of chymistry or analyses found this out; necessity, the mother of invention, pointing out many ways, till at length the right was found. In the East, they throw what is called soap earth into hard waters: this is the true natron of early time, and is a native alkaline salt: in many other countries, they burn green wood to ashes, and tying those ashes in a bag, put them into the water. The ashes contain a salt in all respects, the same with salt of tartar or other alkalines; and they answer the purpose equally.

These are speedy ways, but they are very indelicate ones; they shew the truth, however, of that principle, that there is an acidity in all hard waters, and that their hardness is in a great measure owing to it; for these salts and ashes act only as alkalines, and can take no effect on the waters otherwise than
by

by destroying the acid which made them unfit for use.

The means the Prophet used, recorded in the Old Testament, were, perhaps, no other than such as these; and there need not be supposed a greater miracle than informing men of a thing unknown before, by which the bad qualities of the water might be mended. We are told he put salt into a new cruse and cast it into the water, by which means it was cured of its bad quality. His actions were the dictates of the Almighty, who at his pleasure could use the means or command the end without them; but the mention of salt seems to imply, that this was done by directing the proper natural method, the salt of those times being in a great measure that natron before mentioned, and which is produced abundantly to this day in that country.

C H A P. XXXIII.

Of the different uses of hard and soft waters.

ALTHOUGH the hard waters require to be softened by the air or other means before they are fit for many uses in the family, yet there are some for which they will serve better in their original state. Thus in regard to cookery, if meat be boiled in hard water, it will look ill and taste worse: but fish are

are improved by it, for it gives a firmness to their flesh, which is the thing desired.

For washing, there is no doubt of the preference of soft water, in taking out the dirt; but spring water, in its hard state, is best for giving the linnen a firmness afterwards. Thus all new linnens are managed first with soft water, but the finishing stroke, in bleaching, is given with hard. Muslins and cottons, are always thrown into fresh-drawn well-water, for the same reason; and there is no other way of giving them their true condition.

As improper as this hard water is for meat, it agrees with the more delicate garden stuff, as well as with fish: pease, french beans, and the like, are never done so well as when boiled in it. A great deal of excellence may be given in the same manner to those pickles, in the making of which water is employed; and in which greenness is considered as a beauty. Spring water hard, and as first drawn, will preserve that natural green in the things to be pickled, which is lost by the use of soft water, and which is afterwards restored by the most pernicious ingredients.

In several of the arts and manufactures, the choice of water is a thing of great consequence, though scarce at all regarded. The makers of starch succeed better in proportion as the water which they use is harder; and in the same manner, hard water should be always employed in making of mortar for buildings.

The

The soft is most frequently used, but the ancients were in the secret; and this was one cause of the excellence of their cements. In the making of plaister of Paris, spring water should always be used for the same reason; and the harder the water is, the better it will succeed. Soft water is not capable of giving the due hardness to this, nor the proper perfect colour.

No people understand the difference of waters so well as the dyers: they do not absolutely prefer one or the other kind, but use both. There are certain colours which acids brighten, such as reds of all kinds; and in the dying these, they always use hard water: there are others which acids render muddy, such as yellow and green, and these they dye with soft water for that reason. We do not here speak of the effect of great quantities of acids, but such small proportions as can be found in the hard waters. They also consider the nature of the stuffs in the choice of their water; and when these are of a very strong and firm texture, they use soft water; but when they are loose and slight, and such as will be the better for more firmness, they prefer what is hard.

The water of the same springs will be at sometimes of the year harder, and at others softer; but this is generally in proportion to their purity. In spring they are softer, because of the winter's rains; and in autumn they are

hardest of all, because of the summer's preceding droughth. This will teach the farmer, who is obliged to use hard water in the common occasions of life, at what time it is best, and at what time worst: he will, therefore, know when he must use the most care in exposing it to the sun and air to soften it; and when less will be sufficient.

There is another accident of the seasons, which also conduces to make hard water still harder; this is severe and long continued frost. We do not so well understand the nature of this; but the fact is certain. The farmer, therefore, will know that in autumn and in the depth of winter, his pump water needs most exposing, in order to soften it; and that in spring, it may be used with somewhat less precaution. Experiments shew, that hard waters keep better than soft; and this seems owing to the acid they contain: for it has been proved by the experiments of the ingenious Dr. Addington, that a few drops of an acid spirit will make water keep a great while longer than it would otherwise.

The particular experiments in the preceding account of water we owe to Dr. Rutty, who has prefixed to his excellent treatise of mineral waters, the best account yet given by any author of the nature and contents of those called simple. We shall be happy if our directions founded on what we have seen and on what that careful author has written, may give

give the farmer a full knowledge of the nature of water, and its choice and uses, so far as it concerns the stock and family business,

C H A P. XXX.

Of the farmer's stock.

HAVING gone through the culture of the several necessary crops, we are to enter upon another article of the husbandman's care, nearly as important as the first. This is his stock of cattle, part of which are necessary for his service in the several parts of the work, and part for breeding, for sale, and for their products. Under this head of stock, are comprehended the HORSE and COW kinds, SHEEP and HOGS : poultry and Bees may be considered also under the same division ; but the care of these devolves rather upon the housewife than the husbandman, and their value is trifling in comparison of the others.

As the farmer must have all the four great kinds, we shall direct him in the choice of them ; and as it is his business to keep them in health, we shall add to the general articles of their food, the best remedies for their several disorders : not such as fancy has suggested to speculative writers, but what experience has confirmed.

C H A P. XXXI.

Of the horse.

VOLUMES have been written of the breed and care of horses for the turff or manage; but with these the farmer has no concern. His are to be the drudges of his several employments; and a very plain one may serve for his riding. In the consideration of horses, the number must first be fixed upon, and there will be then very small care requisite in regard to the service: the plow and cart are the two great uses, and 'tis but to have separate horses for them. The only requisite in the plow horse is strength; and to keep him in health upon cheap food is the great concern. The cart horses must be strong also, and they should be nearly of the same size. Therefore a midling size is always best, as it is the easiest matched. The plow and cart horses should always be geldings, if of the male sex, for stone-horses have too much spirit; and all fiery horses exhaust and tire themselves. The right horse for the farmer's drudgery, is one that is strong limb'd, big bodied and healthy; but naturally slow and dull. The driver will make him work. Mares are as serviceable as horses; and when the farmer has pasture ground enough for them to run in, he should buy most of this sex, because the foals they bring

bring him will be an article of profit. We would not have him meddle with the high articles of breeding, but without employing too much of his attention upon this matter, his draught mares will from time to time bring him foals for his future stock, or for a profitable sale.

If possible, let him keep all his horses to one sort of service, never changing them from one kind of work to another. One pace is proper for the plow horse, another for the cart horse, and a different manner of going from both for the saddle. They will perform best, if each set be kept constantly to one of these services: they get into a right way of going by long practice; and when taken out of that service, they are awkward at the new, and long in getting well into the old pace again. In the purchase of mares, when any stress is laid upon their breeding, some regard should be paid to their shape, the foals will sell the better. The mare should have a large body and good forehead, the rest is not material. These creatures will work the greatest part of their time, with very little difference from others; and when there is plenty of pasturage, the foals may run cheap till they are five or six years old, at which time they will bring money. They may be sold sooner, but 'tis much better when they are at this age, and their work for the last year or two will fully pay for their keeping. The farmer's saddle horse will be no

expenſe to him, for he need not be one of a large price, and beſide carrying his maſter, he will do many little ſervices. There is always abundance of theſe odd articles which belong to carriage, rather than draught of any kind; and whether the farmer wanted a horſe for the ſaddle or not, he ſhould never be without one for theſe ſervices. This horſe ſhould not be ſo clumſey as the others, he ſhould be choſen with a thin head, full eyes, ſtrong joints, and ſound tough hoofs, with ſhort ſtrait poſterns, and a riſing chine. He ſhould not be ſo dull as the labouring horſes, nor too ſpirited.

The care of all theſe horſes will be comprized in a few articles: they muſt have ſufficient meat, and be laid clean. Their ſhoes muſt be kept in order, and care taken that no part of the harneſs chafes them in their work, and then all will go eaſy. If they were in good health when bought, they will be preſerved ſo, many years by this plain method; for the farmer's work, though laborious, is not ſuch as ſtrains and ſpoils them,

C H A P. XXXII.

Of the diſeaſes of horſes.

THE farmer ſhould watch the firſt ſign of a diſorder in his horſes, for their diſeaſes are eaſily remedied, when ſeen in time. If any of them ſeem more ſluggiſh than ordinary,

nary, it is a sign of some growing indisposition. Give him a mess of warm grains, with a little salt, once in a week, and let him have twice the rubbing of the others. If this does not recover him, let him be blooded, and abate somewhat of his labour for a few days, but do not keep him altogether idle. This short course, if used in time, will prevent half the disorders of this creature: but if it has been omitted, and a disease shews itself, the remedy must be adapted to the symptoms and appearances, as well as to the cause of the disorder. When horses are inclined to fall into disorders, bleeding every spring and fall is a very proper method. If this does not answer, purging is the next expedient; and these together will often prevent or carry off the causes of disorders. The day before a horse is purged, he must be kept from labour, and have a good quantity of warm scalded bran with the water: then the next morning, before he has any thing to eat, he must have the dose of physick; the best I know is this. Take powder of cream of tartar, and powder of jalap, of each three quarters of an ounce; of aloes, a quarter of an ounce, and of powder of ginger, two scruples; mix these up with butter into a mess, and break it into two balls; grease these with more butter on the outside, and give them to the horse, with a quart of warm weak ale. This is the proper quantity for a strong horse; the proportions must be observed in all cases,

but for those which are of a weaker habit, less will do. When the horse has taken the dose, he must be rid about for a quarter of an hour, a little more than a foot pace, and after that set up an hour and half before he has any thing to eat; then he should have a little good hay, and after this some water milk warm. An hour after, give him a mess of scalded bran, and soon after this ride him out again. This will set it very properly to working; and after this, give him at times more bran scalded, and ride him out a little. The more bran he takes, and the more exercise he has, the better the physick will work, and he should be thus managed till it has done as much as is judged necessary; for the same dose may, by this means, be made to operate, more or less, by this method. The aloes should be of the best kind: there is a coarse sort called horse aloes, but the difference in price, in a few doses, is very trifling, and the other is too coarse even for horses. Bleeding and purging, in the proper manner, will prevent half the diseases of horses: but we shall not leave the farmer at a loss in such other of their diseases, as he may cure without the farrier. When any operation is necessary, the proper person should be called in, and care should be taken, that he is skilful in his business; for too many undertake the cure of these creatures who are entirely ignorant. In cases where medicines may cure them without the knife or iron, we may venture

ture to promise the farmer that he will be better instructed here how to manage the matter himself than they would know how to do it. The disorders, to which horses are principally subject, are the following.

THE STAGGERS. This shews itself by the horse tottering as he goes, staggering, and lifting up his limbs weakly and faintly. When he is put up, he tosses his head about strangely; his eyes swell and run, and at last he beats his head against every thing that is near him. This is commonly brought on by violent cold, when the horse is over-heated; such as riding hard, and then going into water, putting him up without riding after it, or turning him hot from hard labour into cold grass.

As soon as the disease is perceived, the horse must be blooded largely. This often proves a cure when the disorder is taken in time. If the bleeding does not take effect, he must have a strong glyster: mix together three pints of hot emetic wine, and a quarter of a pound of ointment of elder: the heat of the wine will melt the ointment into an oil, and this is to be thrown up when it is a little cool'd. Let the horse be at quiet with this course. Two hours after the first glyster is come away, give another made of the scorizæ of liver of antimony. Two ounces of this should be boiled in two quarts of ale for six or eight minutes: then it is to be taken off the fire, and a quarter of a pint of fallad oil must be mixed with it.

This

This is to be thrown up in the same way as the first ; and after this, the horse should be led out and walked a little. When he is taken in, give him some scalded bran with a little water warm. If he be not recovered by this, one hour afterwards give him a dose of Venice treacle ; an ounce is the proper quantity, and it is best to give it in a pint of very good strong beer. Wine is commonly recommended, but I have found the horses commonly sick and uneasy after it, when given this way, and not when given with the ale. All the time rub his legs frequently and hard, with whisps of dry straw, and from time to time let him be walked out. This generally compleats a cure, but if the disease had got too much head before they were applied, and he does not recover by them, he must be blooded in the nostrils. Cut a thin piece of an oak twig, sharpen it to a point, then split it, and thrust this up first one nostril, and then the other. This will make him bleed freely enough, and will do great service. If he still knocks his head about, the following paste must be put into his ears. Pound some bears foot root, penny royal, rue, and angelica ; mix these up with a spoonful of pepper, and a little spirit of wine ; fill both the ears with this, and sew them up to keep it in, only leaving a hole, by which to pour in a little fresh spirit of wine from time to time, to moisten the ingredients. With these assistances, there is little doubt of his getting well ; and the following

lowing softening glyster will greatly assist in it. Boil a double handful of mallow roots in two quarts of water, for a quarter of an hour: strain it off, and add two ounces of polycresstum salt, and an ounce and half of Venice treacle, and half a pint of fallad oil. Give this warm as a glyster, the same way as the others: after this, though the horse seem well, the glyster with antimony must be given every other day twice more, and care must be taken that he gets no cold for several days afterwards.

THE CHOLICK, when in an extream degree, is as dangerous even as the staggers, and care must be taken of the first approaches of this disorder; for when it comes to that degree, which the farriers call convulsions of the bowels, and which is much the same with what we call a twisting of the guts, the case is nearly desperate. In the first approaches of the cholick, the horse's belly may be perceived to be swelled; he looks uneasy, lies down, rolls himself about, and gets up again; and his mouth is hot, and his eyes look red. After it is come to the more desperate state, he stamps furiously upon the ground, rubs his sides hard against the walls, stretches out his legs and neck, and gives all possible signs of the greatest uneasiness. This disorder commonly is occasioned by the creature's eating too ravenously of coarse green food; and sometimes by sudden cold when he is very hot; sometimes

sometimes also by the eating unwholesome herbs, as these creatures will do when they come into fresh pastures, though they would not touch the same plants in those grounds where they have been used to feed. Very often this simple medicine will cure at once; scald some bran and put to it a tea spoonful of oil of aniseed, stir it together and give it warm. If this does not answer, dissolve a quarter of an ounce of PHILONIUM ROMANUM in a pint of pepper-mint water, and give this for a drench. This is a method I have found succeed in nine cases in ten. Having seen what a miraculous effect this Philonium takes upon our own species in this disorder, I was induced to try it on these brute creatures, and found the same good. When this does not answer, recourse must be had to glysters. Boil two handfuls of mallow leaves, and a quarter of a pound of cummin seed in three quarts of water, for a quarter of an hour; put to this a quarter of a pound of brown sugar, then strain it off; and put to this a quarter of a pint of fallad oil, and two spoonfuls of oil of turpentine. This must be given warm, and the horse must be walked gently after it. After this, give him clean hay, warm water, and bran; and if he does not grow well directly upon this, repeat the dose of Philonium Romanum once in eight hours, and put oil of aniseed in all his bran. When the case is come to the worst before care

is

is taken, or if the worst symptoms come on in spite of these remedies, the horse must be blooded. Then instead of the Philonium and pepper-mint water, give it to him thus: dissolve a dram and half of the Philonium, in a pint of mountain wine; add to it a quarter of a pint of sallad oil, and a full tea spoonful of spirit of sal armoniac; give this as a drench, and ride the horse gently half an hour after it. If this does not answer, mix a grated nutmeg and a quarter of an ounce of jalap, in a quarter of a pint of gin; add half a quartern of sweet oil, and give him this as a drench. Once in three hours, let him have one or other of these drenches; and repeat the glyster as often as he seems violently in pain. He must be rid softly about at times; and by this means, the fit, if it be ever so bad, will be carried off. But care must be taken that it does not return: and this will be chiefly prevented, by giving him only very good dry food, scalded bran, warm water, and now and then a little aniseed mixed with the bran.

COLDS affect horses as frequently as our own species; and in the same manner if neglected in the beginning, they bring on the most dangerous consequences. As soon as this disorder is perceived, give the following medicine: bruise three ounces of fresh liquorice root, and boil it well in three pints of new wort, or else of very mild ale. Strain off the liquor, and put to it a quarter of a pound of honey,

honey, and two ounces of sallad oil; give this as a drench warm early in the morning, and repeat the same every morning till the complaint is thoroughly removed. This will at any time cure a cold, that is fresh caught. But when the disorder is of longer standing, the following BALLS are the best remedy: weigh six pounds of bean meal, and mix with it half a pound of powder of liquorice, a quarter of a pound of flower of brimstone, three ounces of linseed powder'd, two ounces of aniseed, and common seed, and fanugreek of each an ounce and half; bay and juniper berries, of each two ounces; and flower of benjamin half an ounce. Mix all these powders very well, by rubbing them together in a large marble mortar; then beat up the yolks of ten eggs, with two bottles of mountain wine; stir into this two pounds of thin honey, and a pint of sallad oil. When this is perfectly mixed, pour it all into the mortar, and beat it up with the powders into a stiff paste that will easily roll up into balls. If it be too moist, add a little flower to stiffen it; and if too hard, a little wine. When it is fit to roll, make it up into balls of the bigness of a large wash ball, rolling them up in the hands very even and round; then lay them upon a dry sieve turned bottom upwards, in a cool airy room to harden and dry. They will thus keep a year or two, and be always ready and convenient, one ball being the proper dose. The farmer should never be without these

these in his house, for horses are too subject to these disorders ; and these are a certain cure. When they are to be given, the ball is to be melted in a sufficient quantity of warm water, and given morning and night for a fortnight or three weeks together ; within which time there is no great doubt of a perfect cure.

SURFEITS are often brought upon horses by over-working and neglect, in which case the stomach will be so disordered, that he cannot eat his food : he will look tired, weak, and dispirited, and will pine away to his destruction, if not relieved in time. The sooner care is taken, the better ; and the medicine must be of the cordial and refreshing kind. Pour a quart of boiling water upon half an ounce of salep, it will grow to a jelly ; then add to it half an ounce of Venice treacle : give this warm in the evening. The next morning dissolve half an ounce of mithridate in half a pint of good mountain wine, and give him that as a drench ; then walk him out a little. When he comes in, rub him well with dry straw, and then offer him a little very fine hay. He will eat a little, and it will do him good : during the rest of the day, give him at times a little hay in the same manner ; and at night repeat the mithridate and wine. This must be done for four days ; and all the time he must have good food, a little exercise, and frequent rubbing. This will absolutely recover him ; and
in

in a day or two more he will be fit for the common course of business.

LETHARGIES are as common among horses as our own species: this is what farriers call the sleeping disease, or sleepy evil. Bad food is the common cause; and sometimes too much rest when the creature has been used to laborious service. He will grow sluggish, heavy, and sleepy; and when waked by the whip, he will presently fall into the same droning way again: at length he will neglect his food, and soon be lost. The cure is very easy. Bruise in a marble mortar, a good handful of YELLOW STONECROP, called WALL-PEPPER; put to it a gill of white-wine, and when well worked together, press out the juice. Set this by to be ready, rub together a quarter of a pound of elecampane and a dram of pellitory of Spain, both in powder. Slice very thin a quarter of a pound of castile soap, and put it to these powders; work these well together, and then put in the juice: when all is very well mixed, put in as much liquorice powder as will bring the whole to the consistence of a paste. Put this up in a stone jar, and keep it close pressed down. The dose is a piece as big as a walnut. This must be greased over and given him every night and morning till the strength of the distemper is overcome, and after this every morning to prevent a return.

THE GARGLE is an inflammation of the head and throat, to which common and hard kept

kept horses are very subject toward the fall of the leaf. The horse that has this disease is restless and hot, his head swells, and he lays it down, and he rattles in the throat: his eyes run, and he rolls about the ground, rubbing his head and neck against it, and against the walls or trees. This disease is catching: therefore the horse that has it must be immediately separated from all the others; and for fear of any infection before this was perceived, it will be very proper to bleed the whole stable.

The cause of this disease is usually unwholesome food and bad water; and it is most common after droughth in summer, when the ponds are almost dry.

The first thing toward a cure must be bleeding the horse; and as soon as that is done, he should be put up in a dry warm stable, and the following drench should be prepared for him: dissolve half an ounce of mithridate in two quarts of ale; then add one dram of powder of saffron, and four spoonfuls of the juice of garlick; divide this into two parts, and give one at night and the other in the morning. He must not eat any thing for four hours before, nor for one hour after these doses; and they must be repeated every morning and night for two days; and after this, every morning only for two more. In all this time, his diet must be well regulated; he must have boiled oats and malt ground given him in a mash warm; and he must be frequently and
Cc carefully

carefully rubbed. This single medicine, with these regulations, usually performs a cure; and all the care afterwards is to keep him from coarse food and bad water; particularly to let him run in a dry upland pasture.

A ravenous appetite is a complaint not uncommon among horses, and the farmer should look to it upon a double account; because they eat too much, and because it does them little good. Horses that have the disorder, swallow their food without chewing; they snatch at their provender; and what they eat is seen in their dung undigested. They grow weak, and will in a little time be spoiled, if care be not taken to remedy this evil. Mix together a gallon of milk and three pints of oil; and stir in by degrees some rye flour, till it is as thick as can well be swallowed. Give a large drench of this every morning; and always half an hour after, give him by hand a little sweet hay: then set him up without any thing more, and let him be kept quiet. After this, let him be taken to his usual labour, but worked only moderately; and when he has been out three hours, bring him cool in, and give some more new and fine hay: but let it be only a small quantity, and give even this slowly. After this work him again for some hours, and then feed him in the same manner, by a little at a time; but give him so much now, that he can eat no more: after this, set a large quantity before him; and he will not touch it. Thus the disease

ease will be conquered ; and a little care and attention will prevent his falling into it again.

A **FEVERISH HEAT** is a complaint not uncommon in horses, and it is one that wears them down of itself, and frequently brings on other disorders. When a horse is first seized with this, he appears weak and is restless ; changing posture continually, lying on the ground, stretching himself, getting up again slowly, and then rolling about again. On putting a hand to his mouth, his breath is found hot, and his tongue and jaws are red and inflamed. This is a stage of the disease in which it is easily perceived and easily cured ; but it will not be so if left neglected but a little while longer. Beat to powder five and twenty grains of salt petre, and dissolve it in a gill of soft water ; add to this two ounces of thin honey, and three ounces of fallad oil ; then put to the whole half a pint of new milk, and shaking it all up together, give it in the morning, keeping him an hour after it without any food. After this, let him be worked a little, brought in cool, well rubbed, and fed with fresh thatches, or any other of the small pulse new cut. Three days this is to be practised, and it will generally perfect a cure ; preventing much worse mischiefs.

THE ANTICOR is a disease affecting the breast. The creature is uneasy and breaths hard ; his neck grows stiff, and he walks ill, he shakes at times, and has little stomach to his meat.

The cause of this is eating too plentifully of some rich fresh food. Horses, that are turned into clover without due care, very often fall into this. The remedy is easy if the disorder be taken in time, because nothing more is required than to cool and open the body. Let the horse be blooded immediately, and the next day give the following purge: mix together an ounce of powder of aloes, half an ounce of cream of tartar, and a quarter of an ounce of powder of anniseeds. Work them up with some fresh butter into a soft paste, make it into a ball, and grease the outside of this; and give it in the morning with a pint of warm ale after it. If he grows better upon this, nothing need be done but to repeat the purge for twice more in the morning. If his tremblings grow worse, and he falters in his gate, and grows stiff about the breast, the bleeding must be repeated; and if twice does not answer the purpose, he may be blooded as far as four times. There is no way to get the better of the disease but this by bleeding and purging; and however the creature may be weakened by them, he will very soon recover it.

CASTING UP THE FOOD is a troublesome and dangerous complaint. It is occasioned by an overload of some new food. When a horse is turned into fine clover carelessly, or when he eats largely of the fresh pulse kinds, often, his stomach falls into this disorder: and he will
cast

cast up every thing he swallows, water as well as food. The remedy is this. Dissolve in a pint of boiling water half an ounce of mithridate, a quarter of an ounce of philonium romanum, and an ounce of honey; add to this a dram of powder of cinnamon, and a pint of red port wine: give it as a drench. Let him have nothing for two hours after it, and then only a little sweet hay. After this, feed him carefully, and give moderate labour or exercise for three days, and there will rarely be any occasion for repeating the drench. If there be, once more will perfect the cure.

THE YELLOWS in a horse is the same thing with the jaundice in our own species, and may be known by the same signs, and cured by the same medicines. The horse's eyes look yellow; then the skin within side his lips; and after this, he grows faint, loaths his food and declines, sweats profusely, and will fall down as he goes or stands, with real weakness. Bad food is generally the cause of this, and sometimes immoderate labour. As soon as it is perceived, give this drench. Beat together in a marble mortar half a pound of great celandine fresh gathered, a quarter of a pound of young nettles, and the same quantity of wormwood; press out the juice, and add to it a quarter of an ounce of powder of turmeric, and half a pint of vinegar. Put half of this into a pint of warm ale and give it immediately; give the other half eight hours after, in the

same manner. If the disease be taken as soon as the eyes are yellow, this will cure it. If it is of longer standing, bleed the horse moderately; then bruise a double handful of woodlice in a mortar, put to them a half a pound of woody night shade, a quarter of a pound of hemp seed, and a handful of celandine; bruise all together, and pour in by a little at a time a quart of hot ale; press out the ale and juice hard, and give it at two doses. Repeat the bleeding the next day if it appear necessary, and give the same medicine every night and morning, till he is perfectly well. In all this time he must have only dry food, and that very sweet and good in its kind; and now and then some hemp seed should be given with it. He must have some exercise, but he will not till he recovers be fit for hard labour.

THE VIVES is a swelling of the kernels of the neck, and is often so inflamed as to be dangerous. The horse must be bled largely; then bruise half a pound of rue, and a quarter of a pound of yellow stone-crop; put a little ale to that, and then press out the juice; add to this half a spoonful of pepper, and put it into the ears, sewing them up, to keep it from running out directly. If he is not well by the next day, repeat the same again.

BLOODY URINE is a dangerous accident among horses, and generally is occasioned by overstraining them at their work. Bruise in a mortar

mortar half a pound of the HERB ROBERT CRANESBILL; dissolve in the juice pressed out of this a dram of alum; add two drams of dragon's blood, and five grains of sugar of lead; give this for a drench, and repeat it once in six hours till the horse is cured. Sugar of lead is commonly thought a dangerous medicine; but in this small dose I have seen it often given with safety, and with great success.

WEAKNESS AND DECAY sometimes appear in a horse, without any visible cause; but generally it is owing to the creature's having been over-worked. In this case, nothing but rest, good food, and nourishing medicines, can save him. The farmer must be content to nurse him up for five or six weeks; and he may then have several years more profit from his labour. The restorative balls, which have done so much service, are thus made. Mix together two ounces of cinnamon in powder, four ounces of elecampane, two ounces of aniseeds, one dram of powder of saffron, and one ounce of red rose buds dried and powdered. Grind all these well together, and mix them up with five pounds of the flour of thatches, squeeze out the juice of mugwort to the quantity of two pints; add this to the powders and flour; then dissolve a pound of honey in two quarts of white wine, and add this to the rest; then put in a pint of sallad oil, and beat all up into a paste. Roll it into balls as big as a goose egg,

and give one of these dissolved in warm ale every night. He must be kept clean and dry, be well rubbed frequently; and by this means he will grow gradually well.

These are the usual inward disorders of the farmer's horses. There are several external ones, which require the hand of the farrier: but there are some also which the farmer may manage himself: these we shall mention and give him the proper directions.

We shall first except the glanders, but caution him not to attempt any thing himself in that case. All the medicines which have been directed in books are useless; for the seat of the disorder was not known. It is really an inflammation of the skin of the nostrills, and lies in the deep part of them: within the head there is no cure but by making an opening through the bone of the skull, and throwing in medicated liquors. This cannot be done but by a good farrier, nor should be attempted by any other.

SWELLED HEELS attended with a roughness of the coat are a common complaint of horses of the coarser kind, when they are hard wrought and ill rubbed down; better care must be taken; and the following powder added to their food will then compleat a cure. Take powder of antimony, flower of brimstone, and powder of turmerick, of each equal quantities; mix up a large parcel of this, and sprinkle some of it among all the meat that is given him.

him. Continue this, only lessening the quantity, till he is perfectly cured.

THE FARCEY is a creeping sore that spreads all over the horse, if not checked in time. It is first seen in hard lumps upon different parts of the body, which soon afterwards break and run. The cause is over labour, or a surfeit of good food, after the horse has been half starved. When the lumps are found before any of them are broke, the remedy is this. Bleed the horse twice at three days distance. Boil a pound of quicksilver half an hour, in a gallon of water : then pour it off, the quicksilver will be never the worse, but the water will be strong of its virtues. Put to this water six ounces of soap lees, and one ounce of verdigrease : then add a pound of roll brimstone powdered, and a quarter of a pound of white hellebore in powder ; shake it all up together, and rub the places where there are lumps. If any of them break out in sores, notwithstanding, mix four ounces of allum, and then use it as before. The horse must be kept clean, and rubbed with this every night and morning ; and all the time a little powder of antimony and flour of brimstone, mixed together, must be dusted over the food. If one or two sores remain after the rest are well, these must be burnt with the point of a red hot poker, and afterwards dressed with the same mixture. In a few days a black slough will come off, and they will then be soon well.

THE

THE MALANDERS is a scabby disorder, attacking the back part of the fore legs, against the joint of the knee. The scabs grow hard like warts, and have stiff hairs upon them. The vulgar think it dangerous to stop the progress of this disorder; but there is no real occasion for that fear. Carelessness in not cleaning the horse is the general cause; and a better management will help the cure. Clip off the hair from the place, and wash it very clean with soap-suds and a sponge. Boil a pound of foncegreek seed, and two pound of marsh mallow root, cut small in a gallon and half of water, till the liquor is thick, like a jelly, and the ingredients are soft: then wash the part morning and night with the liquor warm, with flannels dipped in it; and afterwards tie on a parcel of the ingredients wet with the liquor, leaving them on till the next dressing. Let this be continued till the cure is perfected. The horse may do his usual work all the time. If the cure proves tedious, the blood is bad; and in that case, there must be some flour of brimstone sprinked over all his food, till he is quite well.

SORE HEELS are very troublesome to the farmer's horses, but he may cure them thus. Put into a quart of white wine a quarter of a pound of green copperas, and one ounce of roman vitriol. Put in the gall of an ox, after the salts are melted, and a quarter of an ounce of oil of vitriol. With this rub the horse's heels

heels every night and morning, and keep him clean at all times. The sores will soon be well, and cleanliness for the future will prevent their return.

CRACKS ABOUT THE FEET are a complaint of the same nature with the former, but more obstinate: They may be usually cured thus. Boil fenugreek seed, and marsh mallow root in water, till the water is as thick as a jelly. Then wash and soak the cracks with this liquor warm; and tie some of the ingredients that have been boiled soft, round the whole part. After four or five times dressing the cracks in this manner, they will grow soft at the edges, and a good ointment then will take effect. Melt over the fire half a pound of yellow basilicon, and stir in half an ounce of powdered verdigrease: mix it well and then let it cool. Spread this thick upon some leather, and after the part is well washed and cleansed, put this on; renew it every day till there is a perfect cure.

STRAINS are very common among horses that are worked hard, and if not taken care of in time, they bring on fixed complaints. Where a strain is perceived in time, the remedy is this. Melt an ounce of alum in a quart of verjuice, and rub the place with this as hot as the hand can bear it. Two or three times doing this will make a cure. If the complaint has been of longer standing, the following is to be used. Slice three ounces of
castle

castle soap very thin, and put it into a pint of spirit of wine ; let it a stand in a warm place till it is desolved, and then put in an ounce of camphire. When this is dissolved also, it will be fit for use ; warm a little of it, and rub the part night and morning.

C H A P. XXXII.

Of Oxen and Cows.

IN the choice of these cattle, the farmer must have regard to the nature of his ground. If he has rich pasturage, he should purchase the larger breeds: if poor, he must content himself with smaller kinds. The Lancashire is the largest breed we have, and the Scotch and Welch are the smallest: but there are many sorts between. The natural breed of Yorkshire are middle sized kind, mostly red and hardy. They yield very good profit, and will thrive on indifferent pasture.

He must chuse all his cattle of this kind, of one sort and colour, as well as one size ; and thus they will always thrive. The breed will depend so much upon the bull, that great care should be taken to chuse one that is strong, well made, and healthy. He should have a large body, stout legs, a thick neck, and a large curl'd forehead, and a good smooth coat upon the rest of his body. As much care at least must be taken in chusing the cow ; for
the

the breed will take partly after the one, and partly after the other. The cows will take after the cow, but the oxen will depend very much upon the bull. The body of the cow should be large and well shaped, the udder large, and with no more than four teats. The eyes large and the forehead broad, the horns short and bent, if it be of the Dutch or Alderney breed; but if any other kind, the longer they are the better. The Dutch or Alderney cows should be preferred where the pastures are rich; but they will starve or fall into diseases in any others.

The husbandman will do well to breed oxen in the course of his employment; but he must purchase the first, and the same care should be taken in chusing them. The largest are the most advantageous if the ground be rich enough to maintain them; if not, such as are suited to its quality will yield most profit: But in any case, they should be chosen well shaped, the body should be large, the legs long and strong, the eyes full, and the horns very large; and the coat must lie smooth and even. In those counties where they use oxen for labour, the strength must be more considered; and such as are yoked together must be of the same height and size.

The diseases of these creatures are fewer than those to which the horse is incident; and in general they are more easily cured. The present sickness of the horned cattle has given

us

us one exception ; yet even this has owed much of its fatality to neglect of proper cautions.

In this deplorable case, the first care must be to separate early the diseased from the rest ; and those which are supposed to be in danger must be put to feed in hilly pastures, where the air is sweet, the earth dry for them to lie upon, and the grass wholesome. When any one is found to be growing ill with it, he must be blooded largely : often this alone will prevent the illness. If the disease does not go off with this, boil a head of garlick for a few minutes in two quarts of vinegar ; then let it stand to be cold. Wash the mouths of the beasts carefully and often with this.

The medicine, which has been most successful in the confirmed stages, is this : dissolve a quarter of an ounce of salt petre in a quart of ale ; add to this a quarter of a pint of juice of rue, and give it at two doses warm, one at night and the other in the morning. Repeat this every day during the illness, and twice a day, at least, wash the lips, gums, and mouth, as before directed. Little good I am afraid has been done by any medicine in this disease ; but, perhaps, more by this than any other.

THE GARGIL is a disease nearly allied to the former, but not altogether so terrible. It is an inflammation about the neck, beginning in the outward part, and by degrees affecting inwardly. The first sign of it is a hard hot swelling in the dewlap ; and this spreads afterwards

wards to the breast and the throat. The first thing must be to bleed the creature largely: Then make an opening in the dewlap where the swelling is, and put in as much of the leaves of bears-foot, pounded to a mash, as the opening will hold. Sew this in with two or three stitches: it will cause a running, and give a stop to the disease. When it has run three days, the threads must be cut, and the bears-foot taken out: then melt some black basilicon, and dip in it a pledget of tow. Put this into the wound just warm, and repeat the dressing every day till it is healed. If the disease be obstinate, and the swelling encrease, bleed again the second or third day.

THE GARGET is a swelling and inflammation of the head, affecting in particular the eyes and lips; and in the end inflaming also the gums and the tongue, but no more. When the throat becomes inflamed, the disease is a real murrain, the same with that of our horned cattle at this time. The garget is of the same nature with the gargill, and must have the same kind of remedy. The creature must be blooded every day till the inflammation is conquered. Immediately after the first bleeding, give two ounces and a half of Epsom salt, dissolved in a pint of warm ale. After this night and morning let the creature have the following drench: take half a pint of warm ale, a quarter of a pint of juice of plantain, two scruples of salt prunella, and a quarter of an ounce

ounce of Venice treacle. Mix all these together, and give it for one dose. In both these cases, the beast must be kept clean, dry, and quiet; and these methods will seldom fail of making a speedy cure.

SURFEITS in horned cattle are always attended with a fever, and this is often dangerous. The creature first of all appears uneasy, then hangs down his head, foams at the mouth, breaths hard, and trembles all over. In this case, the first thing is to bleed. If it be an ox, a quart of blood is a right quantity: if a cow, a pint, or very little more is sufficient. Boil in two gallons of water, a pound of fresh leaves and roots of **HERB BENNET**, and a quarter of a pound of agrimony: strain off the liquor, and give it the creature warm for drink. An hour after the beast has had as much of this as it will drink, give a little fresh mown sweet grass from a dry pasture: and some hours after, give the drink again. At night give a quarter of an ounce of mithridate, dissolved in half a pint of warm ale; and continue this method till the creature is well.

PURGINGS, in these cattle, are generally occasioned by bad food; but they will be very hurtful sometimes, proceeding so far as to bloody stools. In the first stage of the disease, this will cure. Boil half a pound of bistort, a quarter of a pound of tormentill, and two ounces of pomegranate, rin'd, in three
quarts

quarts of water, till there is but a quart left. Dissolve in this a quarter of a pound of diascordium without honey, and add a pint of red port wine. Half a pint of this is to be given warm night and morning.

If this does not perform a cure, but bloody stools come on, add to the medicine before directed two ounces of japan earth, and three drams of roch alum. Give it in the same way as the other; and there is little doubt of a cure in almost any of these cases.

INWARD SICKNESS is a term by which farmers express an obstruction in the liver or spleen, which makes the beast heavy and slothful, and hot. It breathes with difficulty, and the lips and mouth are dry. The remedy is this: bruise a large quantity of WOODY NIGHTSHADE, called bittersweet; moisten it with some white wine while beating, and then squeeze out the juice hard. Give the cow or ox a quarter of a pint of this warm with an ounce of honey melted in it; and repeat the dose night and morning. Take care to have the right woody nightshade, for the others are poisonous. If the cure proceed slowly, boil a great deal of fennell roots in water, and give it to the creature for common drink. And if this be not sufficient, add to every dose of the medicine three spoonfuls of the juice of woodlice.

BLOODY URINE is commonly owing to the eating of green beetles, upon the twigs of

D d

shrubs

thrubs in the hedges, which the cattle browse. The certain remedy for this I learned from Mr. James Gayler, farmer of Denham : it is this. Gather a quantity of that CRANES-BILL, which is called HERB ROBERT, bruise it in a mortar, sprinkling it with red port wine ; and when well mashed, press out the juice. Give a quarter of a pint of this every night and morning. If three doses do not perfectly stop the complaint, bleed the creature, and continue the medicine as before, and doubt not of its effect.

WORMS in the bowels are a common disorder of cattle. It may be known by their growing restless, pining away, and being hot and feverish. They will never thrive till thoroughly cured. Cut to pieces half a pound of-savin, and a quarter of a pound of bears foot: beat these in a mortar with a pound of coarse lump sugar, till they come to a soft paste ; then add an ounce of green copperas, and two ounces of powder of coralline. Make up the whole into balls ; and give one every morning. The balls should be as big as a large walnut.

If this does not answer alone, give after every dose a quarter of a pint of common fallad oil. This has of late been found very serviceable alone ;* and with the assistance of the other remedy, there will be no doubt of full success.

* See the last number of the Philosophical transactions.

FALLING OF THE PALATE is a disorder troublesome to cattle; but if taken in time, the remedy is very easy. Too much exercise in driving, or at labour, is the common cause of it. The creature groans and is very uneasy, and cannot eat till it is set right. When neglect has occasioned it to be difficultly got up, the creature should be sold for slaughter. But when taken in time, it will be cured thus. Mix together an ounce of honey, and a quarter of an ounce of pepper. Throw the beast down, and getting a hand into its mouth, place the palate right, and rub it over with some of the honey and pepper. Then let him get up, and a little after bleed him. Let him eat only fresh meat, and he will not relapse.

C H A P. XXXIV.

Of Sheep.

THERE are several breeds of sheep in England, differing in size, and in the quantities and goodness of their wool. The farmer who has rich pasturage, and all other advantages, should never take any but the best; but in other cases he must be content to suit the kind to the nature of this ground: for he will find more profit from an inferior breed well managed, than from the finest when it is starved. Whatever breed he chuses, let him

D d 2

take

take care the sheep are good in their kind. The wool must not be harsh, but oily and soft; the sheep must be well shaped, and large boned for the size. The rams must be chose with a particular care, because the breed will in a great measure depend on them. They must have soft and well curl'd wool, with the skin white under it; the body should be long, the forehead large and rising; the eyes large and their look chearful. The ewes for breeding, must be large bodied, round upon the buttocks, and short legged; their neck arch'd, and their legs short.

No sheep should be bought that is naked in any part: for the loss of wool is usually the consequence of some inward or outward disorder. The mouth must also be examined, for if the gums be not red and the teeth fast in the head, the creature will come to little good. When sheep are thus chosen in good health, the care must be to keep them so. As to the breeds, there is no certain direction for their choice, because they are often mixed; but in general, the large Lincolnshire sheep are fittest for rich pastures, that lie upon the banks of salt water rivers, or such as are within the influence of the tide.

The best kind for rich pastures, out of the reach of salt water, is the large Leicestershire breed. And for those whose grass ground lies high, yet is tolerably rich, the Herefordshire sheep is best. It is smaller than the last, but

a very profitable breed. For barren pasturage, the Worcestershire sheep is best: it is a little kind with short wool and a black face: this is fittest for gentlemen's parks and warrens; for the meat is excellent, though there is little of it: and the wool is also fine, though scanty.

The use of our turnep fields sets the farmer more at liberty now than he used to be, in regard to his choice of one or other breed: the time of buying them in when intended for breed, is two year old, and they will then breed five years very well.

Sheep have their diseases like other cattle, and often they are very fatal: in general, a great deal depends upon the pasture; and when they are ill in a wet ground, the remedy will be found in removing them to a dry one. The rot is often occasioned only by the wetness of the pasture ground, and damp alone occasions what is attributed to bad food.

A PURGING is a disorder always dangerous to sheep, because their natural condition is to have the stools hard. Sometimes a feverish heat is the cause of a purging; and then it is not to be considered as a disease, but as one of nature's remedies for a worse. In other cases, medicines must be used, and the following is usually effectual. Boil a pound of logwood in three quarts of water to two quarts; put to this an ounce of diascordium without honey, and give a quarter of a pint of it warm four times a day. This will stop the purging,

and it should be left off when the creature is near well.

FEVERS are common among sheep, and are not only fatal often in themselves, but bring on other destructive disorders. The eyes first shew this, being inflamed, and then the mouth: the feet grow hot at the same time, and they grow uneasy and restless. Cold and wet feeding usually are the causes of this; and when the whole flock is distempered together, as is sometimes the case, it is as fatal almost as the rot. They must be removed to a piece of high and dry ground, and have shelter. Every one that is ill must be blooded, and then the following medicine is to be given; dissolve half an ounce of mithridate in a pint of warm ale; divide this into two doses, and give one at night and the other in the morning. If two doses do not produce a good effect, add ten grains of powder of contrayerva to each dose following, and generally two or three days compleat the cure.

COUGHS are common among sheep; and if they are not taken early care of, the lungs will be inflamed, and the creature will die of an absolute consumption. No sheep can be cured of this in the pasture, where the mischief was got, for that is always a damp one: what is required first, is removing them into one that is dry and healthy, where the air is clear and the grass sweet. Press out the juice of colts foot leaves, fresh elecampane root, liquorice, and

and hedge mustard, of each equal quantities; beating them in a mortar and moistening them with some mild ale; to a quart of this juice add five ounces of honey. Give a quarter of a pint of this for a dose, once in four and twenty hours. There will be nothing more required to prevent all bad consequences, and make a perfect cure.

GIDDINESS in the head is a complaint common among sheep that are fed too richly. The farmers call this sturdiness, and the sturdy evil. The sheep must be bled three quarters of a pint. Then dissolve an ounce of assafoetida in a quart of water, add four spoonfuls of juice of garlick, and two ounces of honey: give a quarter of a pint at a time once in three hours, till half is taken; then the rest at doses night and morning. Put the sheep into hilly pasture ground, and he will escape a return. The juice of wild valerian root sometimes answers, but not always.

WHEAZING in the throat is a disorder common to sheep in low grounds. Bleeding is the first thing to be done; about eight ounces is sufficient to take away; then bruise equal quantities of marsh mallow root and penny royal leaves, with one fourth part as much garlick; wet these as they are bruised with some warm water; then press out the juice. In a quart of this, dissolve a quarter of a pound of honey; give the sheep a quarter of a pint for a dose. These disorders are often

neglected, and the sheep are lost; they may always be cured by these remedies when taken in time, and driven to a dry pasture.

THE CRAMP in the legs frequently seizes sheep in autumn, especially such as have lain under the drip of trees; for which reason some call it the wood evil. Bleeding encreases this complaint. Turn the sheep into an upland pasture, keep them warm and dry, and give the following medicine: bruise a good quantity of black hoar hound, as much hedge mustard, and half as much fresh valerian root. Boil them in a small quantity of water, and press it out very hard; give a quarter of a pint for a dose once in twelve hours. Rub the legs with hot vinegar, and drive the sheep gently about, for some motion will assist the medicine in procuring redress. This is an article of consequence, for often a whole flock are seized with the disorder.

THE STAGGERS is as common among sheep as horses; and that giddiness of the head before-named is but a lesser degree of it. In this case, the sheep trembles, and throws itself down, beats its head about, and shews itself to be in the greatest misery. Bleed the sheep three quarters of a pint: then bruise a quantity of wood betony leaves, and half as much penny-royal; wet them with white wine, and press out the juice: give this a quarter of a pint at a time, once in two or three hours, till the symptoms abate. If it does

does not answer quickly, give the assafoetida medicine before directed, and this alternately, till the creature is perfectly recovered. Often two or three doses are sufficient, sometimes one: and the sheep are commonly lost if neglected.

ST. ANTHONY'S FIRE sometimes affects these creatures; farmers call it the **WILD FIRE**: it is contagious, and the sheep that has it must be, therefore, immediately separated from the rest of the flock. Bleed him a little, then use the following medicine outwardly: bruise half a pound of linseed, and as much marshmallow root; boil them up in water till it is as thick as a jelly; spread this upon the inflamed part, and repeat it as often as it dries. The next day dissolve an ounce of glauher's salt in a quarter of a pint of water, and give it the sheep: then wash the part with weak lime water, and the disease will be presently cured, without danger of return.

THE RED WATER is an inflammation that rises into blisters, whereas the former is dry. This appears upon the breast and belly, and is very dangerous. The blisters contain a thin bloody water. The disorder is catching. Separate those which have it from the rest, and then give them the following medicine: mix half an ounce of crude antimony powdered, and two ounces of flour of brimstone, with as much honey as will keep them together in a paste; this is for four doses. Bruise some fresh water

dock root and stinging nettle leaves; press out the juice. Dissolve a fourth part of the paste in a quarter of a pint of this juice, and give it every morning. Let the sheep have sweet grass, a dry pasture, and good water. Cut the blisters as fast as they appear, and dress the places with ointment of elder flowers.

THE ROT, the most terrible of all the disorders of sheep, is produced by wet ground, coarse food, and want of shelter. There are also poisonous plants in these wet lands, which occasion the disease to be more fatal. These are *rosa solis*, pennywort, and red rattle, all common in wet grounds. Therefore the sheep should be removed from such places at the first appearance of the disorder; and the sick separated from the sound, because the disease is spreading. The signs of the rot are feebleness, foulness of the skin, and particularly a dull and heavy look about the eyes. Then the gums grow white, the teeth foul, and the creature will be weak and scarce able to stir: the wool will come off the skin with a touch, and the creature will groan piteously. Good air and shelter, and wholesome food and water, are the great requisites for recovery: for the rot is rather a general decay than any particular disease. Bleeding is always destructive in this disease. Beat to pieces a quarter of a pound of juniper berries, and one ounce of bay berries, two drams of grains of paradise; and add to these a pound and half of bay salt,

salt, and half a pound of loaf sugar : grind all well together : then keep it dry. Give the sheep dry sweet hay in troughs, and sprinkle it with this powder. Boil a pound of masterwort root in two gallons of water, and give this to them mixed with the water they drink. To such as are still worse, give also three drams of mithridate dissolved in a little warm ale every evening.

Lambs, which are gelt, suffer a great deal by ill management, and are often lost ; but there needs only care, and the doing it a proper time to prevent all damage. The stories are endless among the country people on this occasion, and the imaginations idle in the highest degree which they adopt upon the subject. It is an interesting concern that the lambs should do well, they see them often fail, and they don't know why ; and being blind to the real cause, they lay it upon many that are altogether imaginary. The Scotch shepherds, who are all astronomers, attribute the mischief to the time of the moon. They never will cut any when it is in the encrease, and they fancy they succeed better than their neighbours. The Irish, on the contrary, attribute it to the quarter of the wind, and fancy, that it is certain death to cut them when it is in the North. In the Southern parts of England, they attribute a great deal of their ill success to the method of drawing the testicles, instead of cutting ; and in other places, they

they fancy the searing the wound, which is necessary on cutting, is the occasion of all the bad consequences. The shape of the knife has also been called in as an occasion, and the breath of the workman. In the Isle of Wight they fancy certain red spots, which appear upon the skin of the thighs, are a token of certain death, if the creatures be cut at that time; and others fleaing them when dead, and finding such spots, fancy they see a confirmation of that opinion. Mr. Lisle has collected all these opinions, but the farmer need regard none of them; plain reason will be a better director for him than all these. The fact is simply this: the younger lambs are cut, the better they bear it; and the quieter and cleaner they are kept afterwards, the better chance there is for their coming to good. There is no way so well as cutting and searing with a hot iron; but let neither the wound nor the burning be larger than is necessary.

If the lambs be cut when they are advanced in growth, the wound will not heal so well; and as the summer is also naturally advanced at that growth of them, there will be flies ready to blow them. The pain and trouble of this leads the creatures naturally into the water, and after wetting the sore parts, they drag them upon the ground: all this tends to bring on inflammation, and the loss of the creatures follows.

These

These are the causes of the mischief, and these being known, it is easily prevented. The wound will heal after searing, if the creature be kept quiet, but if it be plagued with flies, or suffered to run about and heat itself, it will naturally come to some mischief; for the wound will have all the consequences of other wounds; and if the creature get a fever, it will doubtless inflame and fester.

The season is a great article in this respect. Extreme cold, extreme heat, or very wet weather are all equally bad. In cold weather, it should not be done at all, except to lambs kept entirely under shelter; in hot seasons they must not be suffered to run about; and when it happens that much rain follows soon after the operation, the shepherd must take care to keep them gently in motion, and not let them lie upon the ground.

Of the three ways of gelding lambs, that by cutting and searing is the best, except for very young ones indeed; for in that case, it is best done by the teeth. Those, who are accustomed to do this, are very ready and expeditious at it; and no harm follows: the way by tying is not so successful, and one great reason is, that it is seldom well done.

With due care in either way, there is very little danger of the lambs coming to any harm; but beside, that neglect often brings on mischief. The illnesses, which take off lambs a long time afterward, are often attributed very idly

idly to the gelding. I have known a farmer talk of his lambs dying of it, a month after the operation, when the whole has been perfectly recovered in a week. If any harm happens, it is while the wound is healing. If the creature escapes a fever during that period, and the wound be found, in a reasonable time, perfectly well cicatrized, the farmer may be assured that he has no right to attribute any disorder that may happen afterwards to the lamb to the cutting.

In the house lambs, cleanliness is an article of little less importance than food: they should have clean straw twice a day, and it must be such as is dry; and if a chalk stone be hung up for them, as is done for calves, they will lick it, and their flesh will be much the whiter.

C H A P. XXXV.

Of Hogs.

THE hog being the hardiest of the farmer's stock, and always under his eye, is less subject to disorders than the rest: but there requires some skill in chusing them; and they will succeed the better for careful management. The common hog, which is large bodied and long legged, is the most profitable kind to the farmer, who has good convenience for feeding him: but this kind requires the most and
the

the best food, and also the greatest care. The small low bellied hog is hardier, and feeds on any thing ; it produces a great many young, and is for these reasons, in many cases, preferable to the other. Where the farmer has convenience and abundance of good food, he should, therefore, chuse the first ; but in all other cases the other kind is preferable ; it has one farther advantage also in that, it is not mischievous like the other. Whatever kind is to be kept, the creatures must be chose with care ; they must have thick thighs and a short neck, the body must be long and the belly and sides deep. It is a necessary caution not to take too many ; for the more there are, the more ravenous they grow ; and if at any time they are stinted for food, they will eat one anothers pigs ; or a sow will even eat her own.

Hogs are not exempt from diseases ; tho' being hardy they have fewer than most other kinds.

MEASLINESS is the most common, and spoils more hogs than all the others. The eyes look red and inflamed in this case, and the skin grows foul, rising in pimples, and running into scabs. Put into a good warm mess of victuals half a table spoonful of spirit of hartshorn, and two ounces of bole armenick. Keep him fasting from five o'clock in the afternoon till the next morning, and then give him this. He will eat it eagerly. The same dose must be repeated every day till he is cured, which will be in four or five days ; and for
two

two days after, he should have half the dose to prevent returns.

THE MURRAIN seizes hogs as well as other creatures, and kills many. It rises from bad food and want of water. The first sign of it is a running of the eyes, then the head swells, and the hog carries it on one side: after this he grows hot and weak, refuses his victuals, and pines away till he dies, if not cured. Dissolve in a pint of ale half an ounce of Venice treacle, an ounce of bole armenick, and half a dram of salt petre: add to this four ounces of powder of grey ground liverwort. Mix all this with a good hot mess of victuals, and give it early in the morning. When the hog has eat as much as he likes, take it away; then two or three hours afterwards, set it before him again, and give him no other food. This will bring him to be much better in a few days; and after that, a smaller quantity of medicine must be mixed with his victuals, but he must have some of it in all he eats till perfectly recovered.

SLEEPINESS in hogs is a kind of lethargy; they will doze all day, and neglect their food; and by that means pine away to death. The best remedy is a strong vomit; and the following always answers: press ous four spoonfuls of the juice of asarabacca leaves, and a pint of the juice of the wall pepper or yellow stone crop. Mix this with a mess of warm victuals in the morning. He will vomit, though he eats but little of it; and he will afterwards

afterwards be plainly the better for it. The dose may be repeated at times till he is well: or if it do not operate sufficiently, it may be strengthened with a dram of white vitriol.

THE POX is a name idly given to a disorder in hogs, which is really no other than a more violent degree of the measles before-mentioned. The skin is covered not with pimples, but large blotches, and they break and become running sores, which are afterwards covered with dry hard scabs. Give the hog three quarters of an ounce of mithridate in a warm mess at night, and repeat this three times. Set over the fire in a pipkin, a pound of hogs lard, and three quarters of a pound of tar. When they are melted and well mixed, take them from the fire, and stir in half a pound of the powder of roll brimstone. Wash the hog very clean with strong soap suds, and when he is dry, rub this ointment over all the places where the sores are, then clean out the sty, and keep him dry and clean. Repeat this once in two days till he is well, which will probably be in three or four dressings.

SWELLING OF THE MELT is a disease common among hogs, and often fatal. The creature appears giddy, and runs always on one side, lying also on that side, and rubbing it against walls. He pines away soon after, neglecting his food, and shewing the greatest uneasiness. Bruise some woody night shade, and press out the juice: to a pint of this, put half

a pint of juice of wormwood, and a quarter of a pint of juice of penny-royal. Put half a pint of this into a mess of victuals once every day till he is well. This will be known by his recovering his appetite. When a hog loses his stomach, 'tis certain he is sick; and the first sign of his amendment is always the getting it again.

F I N I S.

